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ERRATA.

P. 388, line 12 from top, delete *margarine*.

405, table, last column, "Average yield per acre, 1887-96," transpose the two last figures, and read: *Lucerne, average yield* 33·6
Meadow hay " " 23·7

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ENGLISH ORCHARDS.

Of the 224,000 acres of orchards in Great Britain, defined in the Agricultural Returns issued by the Board of Agriculture as "arable or grass land used for fruit trees," all but 3 per cent. are situated in England; and of the English acreage so returned there are nearly 100,000 acres in the four counties of Devonshire, Herefordshire, Somersetshire, and Worcestershire. In the first three of these counties this acreage consists mainly of grass land planted with apple and pear trees. In Worcestershire, also, a considerable proportion of the fruit land is planted with apple and pear trees upon grass, though there is a certain acreage of cultivated land planted with standard fruit trees, as at Evesham, and some places on the borders of the Severn. In other fruit-producing counties part of the fruit land consists of grass orchards; for instance, in Kent, Gloucestershire, and Shropshire there is a considerable percentage of grass land planted with standard apple, pear, cherry, plum, and damson trees

It is estimated that of the 218,000 acres of "orchards" in England, 170,000 acres consist of grass land planted with fruit trees, and principally with apples and pears. From the appearance of these grass orchards it is evident, even to those who know but little of fruit culture, that a large

proportion of them is not producing half as much fruit as it should, and that a great deal of the fruit yielded is of a common kind and of a poor quality. Even in counties where the general fruit cultivation is carried out intelligently and well, as in Kent, Gloucester, and Shropshire, there are grass apple orchards in nearly as bad a condition as those of the western counties. Nothing short of grubbing the existing trees and replanting the orchards entirely would be satisfactory, but they have been allowed to remain year after year in the hope of a good crop, which only a miracle could bring about. This state of things, which exists in the majority of grass orchards, has been caused by various forms of neglect and mismanagement, the primary being the unfortunate selection of unsuitable varieties of fruit trees, and indifference with regard to the origin, size, vigorous habit, and healthy appearance of the young fruit trees planted. It must be said, however, that the choice of varieties of apples was comparatively limited when the greater part of the apple and pear orchards were originally planted, and the stocks for grafting, and the grafts were in many cases not chosen judiciously or properly worked; but even in these later days, when many new and approved varieties of apples and pears have been introduced, not much effort has been made to obtain them. The scientific and practical knowledge of stocks and their influence, and of grafting, has greatly improved; but there is much hesitation to adopt so-called new-fangled methods. In the cider-making districts there has been a serious falling-off in the quality of cider, mainly because sufficient care has not been taken in selecting the varieties of apples planted, and in the general management of the orchards, so that there has been a gradual deterioration in the quality, and a decrease in the quantity, of juice produced. Similar complaints are made concerning French cider, and it is said that the cider formerly produced in France, of which the old authors wrote in such glowing terms, is scarcely to be met with now. And with regard to apples for dessert or culinary purposes, the attempts to improve the size, colour, and flavour of the fruit

have not been sufficiently general or systematic to enable it to compete with that imported from the United States and Canada, although there have been many new and valuable varieties evolved during the last twenty-five years, and there is a decided tendency to plant better kinds of apples, at least among the more intelligent cultivators. In the United States there has been continuous improvement in the condition of the apple orchards during the last fifty years, consequent upon the complaints made, about seventy years ago, of their neglected condition and of the disregard of proper principles of management.

Ignorance and carelessness in planting fruit trees have helped to ruin many orchards in this country. Young trees have been either simply rammed into small shallow holes with their roots twisted up in spiral coils so that they could not spread laterally and equably; or the holes were made far too deep, often in untrenched soil, into which the trees were thrust with the bases of their stems considerably below the level of the ground, so that the coiled-up roots could not make the extension necessary for the proper and vigorous development of the trees. Much injury has also been caused to fruit trees by their not having been planted at once after being lifted; the trees have been left for two or more days lying about in sheds or even in the open air, without earth or covering of any kind. Neglect to trim the roots, and excessive and unscientific trimming, by which the roots were not left in proper proportion to the branches, have also been sources of mischief. Sorauer, in his *Physiology of Plants*, says, "A tree intended for transplanting must have a root-system consisting of a great number of short branches provided with many rootlets so that the whole absorptive system is limited to a small area," and he adds that this root-system can only be obtained by systematically pruning the roots from the very commencement, entailing the repeated transplanting of young trees. The usual time for planting fruit trees in this country is in the autumn. It is held by some that the spring would be a better season, but although there is the chance of winter frosts affecting the roots of autumn planted trees, on account of the porosity of recently stirred soil, drought

intensified by moving the soil in spring might seriously injure young trees planted then.

Another frequent form of mismanagement has been the omission to provide proper support and protection for young trees by means of stakes, fences, or guards, with the result that the trees have sustained lasting injuries from animals grazed in the orchards and from the wind: moreover, the strings or cords fastening young trees to stakes or supports have been, in many instances, allowed to cut into their growing and continually swelling stems, thereby causing deep scars, as well as unsightly swellings, which check the flow of sap and afford suitable centres for the attacks of the canker-fungus (*Nectria ditissima*), and the woolly aphis (American Blight, *Schizoneura lanigera*). Bundles of thorns, furze, or faggot-wood, which were sometimes tied round young trees to protect them, also served as harbours for many species of insects which ravaged the trees, and for all kinds of weeds which grew luxuriantly and absorbed all the moisture from the soil around. In the rare cases where substantial cribs or guards of split rails were originally provided, these have been frequently permitted to break down or decay, and, moved by every breeze, to rub against the tender rind of the trees, thus causing abrasions of the cortex, and deep wounds in the cambium layer, which give rise to ugly swellings and excrescences favouring the settlement of insects and fungi of various kinds. Very many of the large old apple and pear trees in our orchards show plainly upon their trunks the marks of this neglect, which has made them more or less deformed and affected their vigour. It is by no means uncommon, even in these days, to find young trees nearly bisected by the strings used to tie them, or disfigured by hideous scars, and more or less crippled by the action of the stakes. Rabbits do considerable damage to young fruit trees, and even sheep frequently nibble away the young bark of the stems that are unprotected. Sheep also much injure young trees by rubbing round them to relieve the itchings caused by ticks and scab insects, and by biting the rind: though it is supposed that sheep do no harm in orchards.

Another cause of the unproductiveness of orchards is the absence of a proper supply of manurial elements. It has been held, and is even now held by many, that it is not necessary to manure grass land on which fruit trees are planted. And with regard to standard fruit trees set on cultivated land, it is supposed that they are able to find ample sustenance from the soil, in which their roots run deeply, and that it is only requisite to give supplies of manure just sufficient for the fruit bushes or vegetables grown beneath them. In the greater part of the grass orchards the grass has been for generations regularly mown, or fed-off by lean stock without corn or cake, and without the application of any compensating fertilising materials, in the mistaken belief that the standard apple and pear trees, whose roots spread underneath the surface of the ground, and whose branches completely overshadow the surface, require nothing to help them to produce continuous crops of fruit beyond that which they obtain from the deeper parts of the earth and the atmosphere. The best orchard-land planted with the most carefully selected, guarded, and pruned fruit trees can no more be expected to yield full successive crops without added manure than land continuously cropped with wheat or barley. It is commonly supposed that grass growing in orchards requires nothing and takes nothing out of the soil, whereas it absorbs all the manurial elements from it as far as its rootlets run, and materially interferes with the proper aeration of the soil. This is a potent factor in the failure of young fruit trees planted in grass orchards to fill up gaps caused by trees destroyed by fungi, insects, mosses, lichens, and starvation. If these do not fail altogether they very rarely make good trees, or make good trees in reasonable time. They are put into starved land and covered with turf within a few inches of their stems. If a larger space is left round them it is quickly overgrown with weeds. In both these cases the supply of moisture to the soil and to the roots of the young trees is much less than if the ground were cultivated. Large spaces should be left unturfed round young fruit trees in orchards, and the growth of weeds prevented just as it would be with crops in fields and gardens.

The record of experiments in this direction made at the Woburn Experimental Fruit Farm is interesting and instructive. In these experiments the bad effects of grass upon newly planted fruit trees were shown by a reduction of 41 per cent. in the size of the leaf in standard apple trees in the second year after planting, while the reduction in growth of wood amounted to no less than 74 per cent. The reduction from the growth of weeds round the young trees was not so great as from grass, but it equalled 62 per cent. in wood growth. Sorauer says turf under trees should be avoided, as the roots of the grass absorb, and in times of drought may even divert, water from the deeper regions which should be reserved for the roots of the tree.* In America and Canada apples are usually grown upon cultivated land, and in almost all cases until the trees have attained considerable age; so that the soil around them is duly aerated by ploughings and hoeings, and it is held by orchardists in those countries that this is fully as important as a supply of fertilizers.

Fruit trees in orchards and plantations receive, as a rule, little or no pruning, although the trees in adjoining gardens and small plots are systematically pruned year by year, and each bough, and almost each twig, duly arranged. It may be the idea that it will not pay to carry out on a large scale that which is known to be essential *en petite culture*, or there may be a notion that when once a fruit-tree gets into the paradise of a grass orchard it requires nothing more from human intervention. So the branches have become hopelessly interlaced, with the result that the possibilities of fruit-bearing have been greatly reduced, while the size and quality of the produce have been gradually depreciated by want of light, air, and actual room to swell and grow properly. Occasionally, when firewood runs short, a raid has been made upon the most densely-branched trees, and many faggots cut out of them by means of axe and bill-hook, occasioning serious loss of sap, which is not calculated to increase their vigour or add to their productiveness. Moreover, the wounds caused by this hacking afford the opportunities necessary for the woolly aphids to form its

* *Populäre Pflanzenphysiologie.* Von Dr. Paul Sorauer.

colonies, and for the destructive canker-fungus and other fungi to establish new centres of infection.

Upon trees maltreated after the fashion described above, badly planted, starved, unpruned, and partly deprived of light and air, mosses and lichens naturally flourish. These, though not parasitic in the scientific meaning of the term, and not actually deriving their nutriment from the apple trees, are encouraged by the unhealthy condition of their hosts, and materially injure them by preventing free respiration and transpiration, by obstructing light, and by affording harbours and refuges for all kinds of destructive insects. A really healthy apple tree, in proper soil and surroundings, that has been carefully attended to from the beginning, offers no suitable conditions for the growth of lichens and mosses, which are certain indications of neglect or of conditions unsuitable for apple culture.

To the principal causes, to which reference has been made above as having produced, or tended mainly to produce, the lamentable condition of a large number of the English orchards, there must also be added the initial mistake of planting the wrong sorts of apples, as well as not the best sorts. "One sort of apple is as good as another," was the opinion of not a few of the originators of the typical orchards in the apple-growing counties. Unfortunately this mistake has been perpetuated both in making new orchards and in filling-up the places of dead trees. Furthermore, as often as not, where a tree fell it was permitted to lie so long as there was a sign of life in the trunk, and many a tree past bearing was left to cumber the ground. Even in the most noted cider-yielding districts but few of the growers took special pains to plant the best sorts of cider-fruit trees, though the soil and surroundings of the land are the most suitable in the whole country for the production of fine cider. And this state of things holds to some extent at the present time. In the less favoured cider-producing localities the apples for this purpose were, and are often even now, regarded as mere refuse, and it was held that any apples would do for making cider. This is, however, being changed in some degree by the insistence of a few practical

men who are doing much to develop the important industry of cider-manufacture and to improve the condition of the orchards of the country.

Neglect in the selection of the best varieties of apples has by no means been limited to the growers of cider-fruits, but has extended throughout all the apple-producing districts. In the first place, orchards were not always seriously regarded as possible sources of considerable profit, and it was not thought worth while to trouble much about them; these views are held in some degree even in these days. Secondly, quantity was considered of more importance than quality, and the finer varieties were thought to be more delicate and shy of bearing than commoner sorts.

This indifference has facilitated the severe competition of the United States and Canada, which has entirely altered the circumstances and conditions of apple cultivation in Great Britain. The transatlantic importations of apples have periodically swamped the trade in British apples; chiefly because the latter have been unable to compete successfully with graded fruit possessing singular uniformity of size, flavour, and colour. These qualities may be seen and appreciated in the samples of the fruit exposed for sale in shops in almost every town in Great Britain and in the various co-operative stores.

In this point of grading, so important and necessary, the American growers are in a much better position than their British competitors, as they are able to utilise all apples which pass through the grading sieves, or are not deemed good enough to export, by making them into "rings" and chips by means of drying machines. These modes of dealing with small or refuse apples have not found any favour at present in Great Britain, nor is grading generally adopted here, the apples being "shot" from the gathering bags into the sieves, pots, or baskets, and consigned to market without further trouble. It would be far better to make two or three grades of fruit, and it is necessary that this should be done to place English apples on fair and even terms of competition with those imported from the United States and Canada.

It is generally believed that many of the famous time-

honoured sorts of apples have degenerated by a gradual process of exhaustion of their original attributes and normal vitality consequent upon reproduction by grafting, but this is not supported by physiological laws: and there is no doubt that the so-called degeneracy has been caused by unskilful grafting, or the grafting of trees whose course was already nearly finished, and, chiefly, by the great neglect of the trees, their improper treatment, and the numerous disorders occasioned by fungi, insects, lichens, and mosses which have been allowed to remain without any attempts being made to combat their attacks. The same condition exists in the famous French apple orchards in Brittany, according to the report of M. Crié, deputed by the Minister of Agriculture, in 1896, to ascertain the causes of the decay of the cider-apple trees. M. Crié says, "It is beyond doubt that many of the apple trees are decaying and dying in the districts I have gone over. There are many different ideas of the vaguest and most conjectural character as to the cause. When one talks to the cultivators as to the decay of their trees, they have already prejudged the case and have made up their minds without further attempts to solve the problem. . . . Sometimes the devastations caused by various fungi and insects are enormous, and the new varieties of trees are not more exempt than those of ancient date. It is said usually of these diseased trees that their decay is a natural affection arising from a degenerate state"—an opinion which he considers to be devoid of foundation.

Even if the objection to plant old varieties, and to graft from old varieties were well founded, many new varieties have been, and are being continuously, introduced, suitable for all soils and climatic conditions, of fine quality and appearance. In many of the fruit-growing districts there are skilful nurserymen, possessed of much scientific and practical knowledge, engaged in evolving new varieties of apples specially suited to the circumstances and requirements of different localities. The yearly catalogues of these nurserymen show the valuable work that is being carried on in the development of improved sorts, and the exhibitions of apples held in London, under the auspices of the Royal Horticultural

Society, and in other parts of the country, plainly show that these efforts have been very successful in raising the standard of the fruit in size, colour, flavour, and in all the qualities essential for dessert and culinary sorts. And although there has not been such general and energetic action with regard to cider fruit—for it has been difficult occasionally to get young trees of established varieties, and grafts true to name of sorts noted for cider-making—yet a good deal has also been accomplished in this direction, and the cider-making industry has been lately re-established in several districts from which it had entirely disappeared. Nurserymen in cider-making counties have turned their attention to getting true grafts of old-established favourites, and to producing new varieties, so that the number of valuable additions made to the list of cider-apples of late years has been more than may be generally supposed, though there has not been much readiness on the part of cultivators to plant them. In 1883 the Pomona Committee of the Woolhope Naturalists' Field Club reported that the experiments they had caused to be carried on during four years for the restoration of the Fox-whelp and Skyrme's Kernel apples, and the Taynton Squash pear, had completely succeeded, and that they had 800 young trees in vigorous health. The efforts made in recent years to improve the condition of the cider-orchards and the quality of cider have done considerable good, and will without doubt bring about much-desired results.

(To be continued.)

OUR IMPORTS OF FEEDING STUFFS.

The extent to which the maintenance of the live stock of the United Kingdom is dependent upon the supplies of imported feeding stuffs is a subject of considerable interest in its relation to the home production of meat and milk. Among imported articles used wholly or partly as feeding stuffs, the principal are oil-cakes, oil-seeds, barley, oats, maize, beans, pease, and hay; and to these may be added the minor imports of rye, buckwheat, and meals of various kinds*. It is difficult to arrive at any exact appreciation of the volume of such materials which is converted into meat and milk, inasmuch as a certain quantity of some of the articles enumerated is used for other purposes. For example, imported oats, maize, and beans enter, in different proportions, into rations for horses; foreign barley and maize are used in the brewing and distilling industries; and these grains, as well as several of the other products mentioned above, are employed in poultry foods, in the manufacture of some proprietary preparations, and in other directions. But, if under the term live stock be included horses and poultry, the only disturbing factors for which allowance need be made are the quantities of the several imported materials consumed in various manufactures. In the first place, therefore, attention may be directed to the chief features connected with the imports and uses of the principal kinds of feeding stuffs, beginning with the grains.

Of the fodder grains imported into the United Kingdom maize is one of the cheapest, its average import value at the present time being about 3s. 6d. per cwt. Only on four occasions during the past twenty years have our annual

* In addition to the articles mentioned, some portion of the net imports of rice and of unenumerated farinaceous substances are utilised for feeding live stock.

supplies of this cereal been below 30,000,000 cwts., and in each of the past two years they have exceeded 50,000,000 cwts. The recent great increase in the supply has been due mainly to larger shipments from the United States, although Argentina contributed a heavy consignment in 1896. The relative imports from these two countries in the past three years have been as follows :—

	1895. Cwts.	1896. Cwts.	1897. Cwts.
United States - - -	15,438,000	27,427,000	39,645,000
Argentina - - -	7,219,000	16,108,000	3,549,000
Other Countries (chiefly Roumania and Russia) -	11,287,000	8,237,000	10,591,000
	<u>33,944,000</u>	<u>51,772,000</u>	<u>53,785,000</u>

In connection with the foregoing figures it may be noted that according to the statistics published by the Department of Agriculture at Washington, the area under maize in the United States has been maintained at over 80,000,000 acres for the past three years, the estimated annual production from this acreage for the same period being over 2,000 millions of bushels. The farm-price of this cereal is stated to have fallen from 1s. 10 $\frac{3}{4}$ d. per bushel in 1894 to 10 $\frac{3}{4}$ d. in 1896, but there was a slight recovery in 1897, when the price rose to 1s. 1 $\frac{1}{4}$ d per bushel. In 1889, when the maize crop was estimated at 2,113 millions of bushels, the farm price was 1s. 2 $\frac{1}{4}$ d., and this was the lowest price recorded up to that year.* The United Kingdom has taken nearly 50 per cent. of the maize exported from the United States in recent years. A relatively small quantity of this cereal is consumed in breweries and distilleries, and in the manufacture of confectionery and proprietary articles; the greater portion is used as fodder for live stock.

The increasing consumption in this country of cheap fodder-barley from Russia was commented upon in an

* The relation of the exports of maize from the United States to abundant crops and low prices may be seen from the following figures :—

	Estimated Crop. Bushels.	Farm Price per Bushel.	Exports. Bushels.
1889 - - -	2,113,000,000	1s 2 $\frac{1}{4}$ d.	103,419,000
Average			
1890-94 - - -	1,602,170,000	1s. 9 $\frac{1}{4}$ d.	50,168,000
1895 - - -	2,151,000,000	1s. 0 $\frac{3}{4}$ d.	101,100,000
1896 - - -	2,284,000,000	0s. 10 $\frac{3}{4}$ d.	178,017,000

article which appeared in this Journal for September, 1896, wherein it was shown that in the three years 1893-95, a period in which the home production of hay and roots was seriously reduced from climatic causes, the supply of Russian barley constituted practically 60 per cent. of the total importation of this grain. In 1894, when the imports of barley from all sources amounted to 31,241,000 cwts., Russia contributed as much as 19,447,000 cwts., but her average shipments for several years prior to 1893 had been about 6,000,000 cwts. The following figures show the proportion of Russian grain in the barley imports of the past two years :—

	1896. Cwt.	1897. Cwt.
Russia - - - - -	9,245,400	7,494,100
Roumania - - - - -	2,975,000	3,275,200
Turkey - - - - -	3,680,800	3,150,700
Other countries - - - - -	6,575,800	5,038,700
	<hr/> 22,477,000	<hr/> 18,958,700

The average value of the Russian barley imported in 1897 was 1s. 9½d. per bushel, and this has been about the value for the past five years. It may be assumed that practically the whole of this cheap grain is used for feeding stock, and it is probable that some portion of the inferior varieties received from Roumania and other countries may be similarly employed.

The principal features of the import trade in oats are dealt with elsewhere in the present number of this Journal. Our average net importation of oats in recent years has been approximately 16,000,000 cwts. yearly, of an average value of £4,000,000. The quantity of this imported cereal used for purposes other than stock-feeding is inconsiderable.

The average annual importation of beans into the United Kingdom in the past three years has amounted to 3,360,000 cwts. Oriental countries have for some time past furnished the major part of our foreign supply of this article—Egypt, Turkey, and Morocco being credited with about 78 per cent. of the total importation in the period mentioned above. Of

pease the average importation has been 2,750,000 cwts., two-thirds of this quantity being contributed by Canada and Russia. The average declared value of the beans imported in 1895-97 was 5s. 4d. per cwt., or about 3s. 0½d. per bushel; the pease being valued at 5s. 7d. per cwt., or 3s. 2¼d. per bushel. Imported beans and pease include some varieties used for culinary purposes, but the quantity so consumed relatively to the total importation is very small: fodder-products preponderate largely in the supply.

In addition to the grains to which reference has been made in the foregoing paragraphs, there is a small importation of rye, buckwheat, and various meals, some portion of which is used as fodder; but, in view of the comparatively insignificant dimensions of this trade, it is not proposed to take these articles into consideration.

In ordinary seasons foreign hay commands only a small market in this country; the average imports since 1895 have been at the rate of 115,000 tons annually, the principal sources of supply being Holland, France, Germany, the United States, and Canada. The average import value is about £3 7s. per ton.

The next important class of feeding-stuffs consists of oil-cakes and oil-seeds. Of the former, the average importation in the past few years has been roughly 300,000 tons, of the declared value of £1,700,000. Over two-thirds of this quantity consists of linseed cake and the remainder is made up chiefly of cotton-seed cake. The United States furnishes about one-half of the total supply of cake, and Russia contributes the greater part of the remainder. In the case of cotton-seed cake the consignments from the United States form about 70 per cent. of the total importation, and Egypt ranks as the second source of supply. Imported oil-seeds are largely employed in the manufacture of cakes and feeding-meals, after the greater part of the oil has been extracted for other purposes. In the Trade Returns the quantities of linseed and of rape-seed imported are shown in quarters, but the entries of cotton-seed are given in tons. The average quantity of linseed imported annually for the three years 1895-97 was about 2,152,500 quarters, which, at

the rate of 432 lbs. to the quarter, amounts to 415,000 tons; of rape-seed the yearly imports for the same period were 230,000 quarters, or about 44,000 tons. To these seeds must be added an importation of 385,000 tons of cotton-seed. Thus the average annual supply of oil-seeds for the three years has been about 844,000 tons. In estimating the quantity of oil-cake produced from this supply of oil-seeds, allowance must be made for the extraction of the oil and for waste in manufacture. According to statements furnished in 1892 to the Departmental Committee on Fertilisers and Feeding Stuffs, the production of cake would represent approximately 50 per cent. of the weight of the seed imported, and this output corresponds approximately with calculations based upon the known percentages of oil contained in the various seeds in question. If this ratio of cake to seed be accepted, the total amount of oil-cake and oil-seeds imported annually in recent years would represent about 722,000 tons of cake, and this supply at the price of 104s. per ton, which was the average value of oil-cakes imported in 1895-97, would be worth £3,750,000.*

An attempt may now be made to estimate what proportion of the principal products mentioned in the foregoing paragraphs is consumed by live stock, including horses and poultry. Barley and maize, as has already been shown, are employed in brewing and other industries as well as for fodder. In the case of the former cereal there can be little doubt that the grain received from Russia is, owing to its inferiority and cheapness, used mainly as a feeding material for stock and it is probable, that some portion of our receipts of Roumanian and Turkish barleys are utilised for a similar purpose. For the present estimate we may therefore include under the heading of fodder-barley the whole of the consignments from the first-named country, leaving some margin for the smaller proportions of other varieties which may also serve as fodder. In this way the quantity of fodder barley imported annually during the past three

* It is probable that the average value of the cakes manufactured in this country from imported seed would be more than that of imported oil-cake.

years may be taken at a minimum of 10,000,000 cwts., or about 2,800,000 quarters of 400 lbs.

With respect to maize some allowance must be made for the relatively small demand for the cereal in the manufacture of proprietary articles and confectionery as well as in the brewing or distilling industries. An indication of the extent of its employment in the brewing trade is furnished in a Return* recently issued by the Department of Inland Revenue, and it may be assumed that this and other industries do not absorb at the utmost more than ten per cent. of the total supply. On this assumption the quantity of maize imported annually for consumption by live stock has amounted in the past three years to 41,851,000 cwts., of the value of £7,926,000.

The imports of beans and pease include, as stated above, some varieties used for human consumption, but in the case of these products it will be quite safe to estimate that the proportion employed as fodder constitutes at least 80 per cent. of the supply of each of them.

Hay, oats, and oil-cake, including the cake represented by the imports of oilseeds, present no difficulties. The entire importation of these articles may be regarded as forming part of the supply of feeding stuffs.

Thus, with the allowances and deductions considered above, an estimate of the average quantities and values of the principal materials imported annually for the maintenance of the live stock of the United Kingdom during the past three years furnishes the following results :—

	Tons.	£
Barley - - - - -	500,000	2,059,000
Maize - - - - -	2,092,500	7,926,000
Oats - - - - -	820,500	3,996,000
Beans and Pease - - - - -	244,000	1,332,500
Oil-cake - - - - -	722,000	3,754,000
Hay - - - - -	116,000	388,500
	<u>4,495,000</u>	<u>19,456,000</u>

It is probable that the figures relating to barley, maize,

*H.C. 83, Brewers' Licences. The Return shows that the quantity of rice, flaked maize, and similar preparations used in the beer brewed in the United Kingdom in the year ended September 30th, 1897, was 747,063 cwts.; 194,944 bushels of unmalted corn, and 2,569,457 cwts. of sugar and its equivalents were also employed, and these materials may have included a small quantity of maize and maize glucose,

beans and pease are under-estimates, hence the total of 4,495,000 tons may be regarded as not exaggerating the actual position. It would be obviously impossible to produce this quantity of feeding stuffs, or its equivalent in other materials in this country without displacing products already cultivated. The imports of fodder corn alone, excluding maize, would, on the basis of the average annual yield per acre in Great Britain in 1886-95, represent the production of 2,250,000 acres.

THE SPOTTED FLYCATCHER (*Muscicapa Grisola. Linn.*).

The spotted Flycatcher, known also in some districts as the "Beam bird" because it sometimes builds its nest on beams in outbuildings, is, as its name signifies, a devourer of insects. On account of its notorious insectivorous habits it is called *Gobemouche* in France and *Fliegenschnapper* or *Fliegenfanger* in Germany. It is a fairly common bird in England and some parts of Ireland, but it is not so frequently met with in Scotland. It arrives in this country at the beginning of May. Gilbert White says it comes between May 10th and May 30th; but Markwick in his calendar gives the dates between the 25th of April and May 22nd. Other naturalists say that it generally appears when the oak is in leaf, which means that the date of its arrival in May depends upon whether the season is backward or forward. Selby says it seldom makes its appearance before the latter part of May, or until the woods are in complete foliage, when the particular insects that compose its food are in full vigour and maturity. Howard Saunders states that it has been observed exceptionally in our eastern counties as early as April 23rd. In Gilbert White's calendar the bird is recorded as departing from these shores between September 6th and September 29th, and these dates agree pretty closely with those given by Markwick and other observers.

The spotted Flycatcher frequents orchards, gardens, plantations and woods, and the banks of streams. It feeds exclusively upon insects, though it has been accused of eating fruit by those who have seen it near cherries and raspberries when in search of insects attracted by ripening fruit. Yarrell states that no remains of fruit were found in the stomachs of Flycatchers which had been suspected of taking fruit,



THE SPOTTED FLYCATCHER.



and killed. Selby also observes that he has not been able to verify the alleged fondness of this bird for cherries, and he is inclined to believe that the Garden Warbler, sometimes called the greater Pettichaps (*Sylvia hortensis*) has in most cases been mistaken for the Flycatcher.

The spotted fly-catcher may often be seen either taking a short sharp flight in search of insects, or perched on a rail, gate, or branch, making frequent swoops at passing insects and returning to its coign of vantage. Sometimes it half jumps, half flutters, from the ground and snaps up flies, gnats, and other insects within easy reach. It takes all kinds of insects: moths, flies, beetles, and aphides. During August when the air is thick with aphides coming in swarms from the hop gardens, or from damson trees, the Flycatchers appear to be perpetually in motion from their eagerness to devour the winged hosts. Sawflies are also a favourite food with them, and Flycatchers should therefore be encouraged to breed near gooseberry plantations in order that they may clear off the destructive gooseberry sawfly (*Nematus ribesii*) which is so difficult to get rid of when once established. Macgillivray says that the food of this bird consists exclusively of insects of various kinds. He gives a description of the feeding of their young by a pair of Flycatchers. The parent birds brought food to the nest five hundred and thirty-seven times during the course of a day. "Their motions," Macgillivray says, "were so uncommonly rapid that I could not for a single moment keep my eye off the nest. By short jerks they usually caught the winged insects. It is impossible to give the precise number of flies that might have been consumed by this brood, as they sometimes brought them one large fly, at other times two, three, four, five, and even more flies of different sizes."

The spotted Flycatcher is not quite six inches in length from head to tail. The head and back of the bird are of a chestnut-brown colour, while the wings and tail are of a darker brown; the breast and the under parts vary from greyish-white to greyish-brown; the legs and bill are dark brown. On either side, at the base of the bill, there are numerous hair-like pointed projections, or short bristles,

which are peculiar to a few species of insectivorous birds, and serve to prevent insects from getting on the bill. The female is slightly smaller than the male, but almost identical in colour.

The spotted Flycatcher constructs its nest of stems of grass, horsehair, moss, lichens, feathers, and wool, in a hole in a wall or tree, or in the fork of a tree, on beams in out-houses, ledges of rocks, in fruit trees nailed to walls, and on the stumps of trees. The eggs are usually five in number, varying in colour from pale green to bluish-white, mottled with rust-coloured streaks. Owing to its extraordinary insectivorous propensities and its perfect harmlessness, this little bird ought to be carefully protected and encouraged to increase in numbers.

THE SCLEROSTOME WORMS OF THE HORSE, AND THE EMPLOYMENT OF THYMOL AS A REMEDY.

Two species of Sclerostome worms are known as abundant in the horse, namely, *Sclerostomum equinum* (Müller) and *S. tetracanthum* (Dies). Both often produce fatal results, especially the last-named. These species are well known to veterinary surgeons, but I feel confident that two species have been included under the name *tetracanthum*. Although these armed Sclerostomes have been known for a great many years, it is only recently that treatment has been of any avail.

During the past two years a number of cases of these vermiceous diseases have been brought to my notice, some in the form of severe epizootic attacks. The results of investigations in these diseases may be briefly summarised as follows.

There are evidently three worms belonging to the genus *Sclerostomum* found in the horse, which may be identified by the following general features:—

S. equinum (*armatum*) (Müller), red or brownish-red in colour, from 18-50 mm. long, mouth armed with a circle of teeth on the innermost ring, the outermost ring carrying six papillæ; the caudal pouch of male trilobate, posterior ribs trifurcate, middle double, anterior cleft. The female has the tail obtuse.

S. tetracanthum (Dies), much smaller than the above, varying from 8-16 mm. long, colour white or dirty white, body tapering anteriorly; mouth circular, with a ring of teeth, outer ring with six papillæ; *two long lateral spine-like bodies* a little in front of the termination of the œsophagus; caudal pouch of male excised on ventral surface, posterior ribs trifurcate, middle double, anterior cleft. The female has the tail pointed.

S. rubrum (N. Sp.). This worm is very similar in form to the above, but differs from it in several essential features, firstly in colour, it being always red, whilst *tetracanthum* (at least what I take to be Dies species) is white, secondly the

cuticle is well ringed, thirdly there are no traces of lateral spines, fourthly they are smaller in size, the males varying from 8—12 mm., the females 10 to 15 mm., lastly they are not nearly so often found in copulâ as the white species. For this worm I propose *temporarily* the name of *rubrum*.

Sir George Brown informs me that for the last 30 years veterinary surgeons have taken this red species to be tetracanthum. Discrepancies in regards to the identity and characters of tetracanthum have been pointed out also by L. Savournin.

The life-histories of the above are briefly as follows (as far as we at present know):—*Equinum*—in this species we have a tolerably complete history. The ova laid by the female come out in the horses' dung and hatch, I find, in from 5 to 8 days on damp sand into little white cylindrical embryos. These embryos shrink up in their old skin, which forms a kind of puparium in which the larval worm moults twice. The horse obtains these embryos in this condition in water and doubtless with grass. These embryos then burst out of the shell and enter the mucous membrane of the caecum and colon; here some remain, forming small tumourous lumps, but the majority get taken along with the blood and eventually reach the posterior branches of the dorsal aorta, where they form aneurisms. The mesenteric artery is particularly liable to their invasion. In these aneurisms the asexual worms form a thrombus in which they partly live. After a sojourn of some months in this position they leave their abode and are carried on by the blood back to the walls of the caecum and colon, here they bury themselves in the sub-mucous coat and form tumourous cysts along with those that remained there at first. Eventually the worms in these cysts mature and escape into the intestinal contents, become sexual, and grow into the large *S. equinum*. They are sometimes so abundant that they completely block up the artery and cause it to rupture. The result of their presence is internal hæmorrhage and violent colics, which, in a particular case notified to me, was undoubtedly the cause of death. The filly in question had been dosed with thymol, but only in five-grain doses; it does not appear that this substance has

any effect upon haematozoa. In future cases where equinum is suspected in the vascular system, I propose experimenting with *chinosol*, a preparation used in the army hospitals as a disinfectant both by surgeons and veterinary surgeons in India and Egypt. I have tried it for a persistent form of "thrush" in horses with marked results, after all other treatment has failed. The value of *chinosol* was pointed out to me by Capt. Kerr, V.C.

Tetracanthum apparently does not enter the blood. The eggs are introduced into the host with water, and possibly forage, and give rise to the embryos, which encyst direct in the walls of the gut, generally the cæcum and colon, where they are said to form tumours similar to those formed by equinum. Here, lying in the cysts, the white coiled worms produce inflammation of the intestine, colics, and serious and fatal anæmia. When mature the worms make their exit out of the cyst by an aperture at the summit, and live free in the intestinal contents, usually in copulâ. This is briefly the life-history of the *white* sclerostome described by Dies and figured by Schneider. These I have found only on two occasions, and they were larger in size than the abundant red one, and these white worms I take to be the true *tetracanthum*. Those obtained were expelled by Thymol.

Rubrum is very similar to the above, and, from experiments conducted, they have evidently a similar life-history. They develop direct. The ova hatched out in from five to six days after expulsion, when put in a .2 per cent. solution of hydrochloric acid at the ordinary body temperature (of horse). The eggs segment in the uterus of the female, and are laid whilst the worms are in the intestines. The embryos and ova are obtained in polluted drinking-water and from the grass in the meadows and paddocks where infected horses have been kept. The young embryos form cystic tumours similar to *tetracanthum* and *equinum*, from which they escape into the intestinal contents as red worms, sexually mature. I at first thought these small red worms might be immature *equinum*, but later they were all found sexually mature. The details of this species are given in the Journal of the South-Eastern Agricultural College.

A Remedy for Sclerostome Worms.—All sclerostome diseases have long baffled curative treatment, but thanks to the suggestion of Dr. Blanc, of Cannes, a remedy is now known for the intestinal and mucous attacks of these pests, which has in all cases proved successful. This nematocide is *Thymol*. Thymol, although used for the first time in England as a horse nematocide, has been employed previously as a human drug. Thymol was first used in a case of a severe epizootic of sclerostomes that I investigated at Charlbury, by Miss Dillon in her stud of Arabs. The dose administered was fifteen grains in the morning and again at night, followed by a mild purgative. Ten grains is sufficient for a foal. Sir George Brown informs me he has used as much as three drachms without any evil results. Another correspondent gave sixty grains without any serious symptoms. In one of Capt. Cullen's fillies bleeding at the nose followed the dose of Thymol, but not in any serious form. From previous experience fifteen grains may be taken as sufficient to stem the advance of the disease, but in foals ten grains is ample. Experiments have shown that these doses kill not only the free worms in the intestinal contents, but also those in the cysts. Practically all Nematodes are affected by this substance, *Ascaris megaloccephala*, being readily expelled by it. It may, therefore, be generally substituted for san-tonine, which is extremely erratic in behaviour.

In experiments conducted in dogs, Cestode or Tape worms were not moved by Thymol; it is apparently valueless as a tænicide. The dose for round worms in dogs should not exceed two grains. Three grains produced partial prostration in a bull-terrier. In fowls one grain doses have caused the rapid expulsion of *Heterakis* worms. Cats can also take two-grain doses without being affected.

Thymol is best dissolved in spirit; fifteen grains easily dissolve in an ounce of spirit, and should be administered in milk.

Should worms still be passed, a second dose two days following is sufficient to complete the cure. As the worms in the walls of the intestines are destroyed, repeated doses are not necessary.

FRED. V. THEOBALD, M.A., F.E.S.

THE OATS SUPPLY OF THE UNITED KINGDOM.

Oats may be classed with the few agricultural products of this country which have withstood the stress of foreign competition. For the past thirty years the area under this cereal in the United Kingdom has been maintained at approximately 4,000,000 acres, and the average annual crop since 1885—the first year in which the produce was officially estimated—has been about 20,000,000 quarters. The relations of the home production and the imports to the aggregate supply may be gathered from the following statement, which shows the average quantity of oats available for consumption annually in successive triennial periods since 1886. In estimating the proportion of home-grown oats entering into the annual supply it has been assumed that the quantity consumed in a calendar year would be made up of one-third of the crop harvested in that year, and two-thirds of the production of the previous year.

Periods.	Average Annual Acreage.	Average Annual Supply of Home Production.	Average Annual Net Imports.	Average Annual Total Supply available for all Purposes.	Per-centage of Net Imports to Total Supply
	Acres.	Qrs.	Qrs.	Qrs.	
1886-88	4,323,000	19,991,000	5,617,000	25,608,000	21'9
1887-89	4,231,000	19,849,000	5,907,000	25,756,000	22'9
1888-90	4,138,000	19,987,000	5,716,000	25,703,000	22'2
1889-91	4,122,000	20,674,000	5,479,000	26,153,000	20'9
1890-92	4,154,000	20,967,000	5,402,000	26,369,000	20'5
1891-93	4,253,000	21,044,000	5,618,000	26,662,000	21'1
1892-94	4,384,000	21,307,000	5,414,000	26,721,000	20'3
1893-95	4,480,000	22,072,000	5,375,000	27,447,000	19'6
1894-96	4,437,000	22,167,000	5,853,000	28,020,000	20'9
1895-97	4,338,000	21,629,000	6,078,000	27,707,000	21'9

It will be noticed that the average proportion of the imports is barely 22 per cent. of the entire supply, whereas in barley it is over 40 per cent., and in wheat it is nearly 80 per cent. Moreover, according to the figures given

above, the foreign ratio would appear to be practically stationary; but in this connection it may be observed that maize has to some extent displaced oats as a fodder for horses, especially in the large towns.

Until last year Russia was our principal purveyor of oats; but in 1897 she for the first time ceded a position she had occupied for a quarter of a century to the United States, whence we received 2,900,000 qrs. out of a total importation of 5,786,000 qrs. Only on four occasions previously had the latter country made a noticeable contribution to the imports, viz., in 1885, 1890, 1892, and 1896; in the first three of those years her shipments to British ports did not exceed 923,000 qrs., although in the remaining year they amounted to 1,634,000 qrs. Russia, on the other hand, for twenty-five years prior to 1897 seldom furnished less than 50 per cent. of the foreign supply, and in some years her share amounted to as much as 90 per cent. The smallest quantity with which she is credited in our trade accounts during that period is 1,749,000 qrs. in 1873, when the total quantity imported from all sources was 4,275,000 qrs.; the largest is 5,816,000 qrs., in 1888, out of a gross importation of 6,738,000 qrs.

Sweden held for a considerable time the second place among the foreign competitors in the trade in oats; during the past two years, however, she has been reduced to the third rank by the increasing competition of the United States. For fifteen years before 1888 the quantity of Swedish oats imported annually into this country usually oscillated between 1,077,000 qrs. and 1,615,000 qrs.: it rose once to 1,696,000 qrs., but this rise was immediately succeeded by a fall to 867,000 qrs. Since 1887 there has been a remarkable diminution in the supply of Swedish oats in our markets. In eight of the ten years which have elapsed her annual shipments to this country have ranged only from 287,000 qrs. to 610,000 qrs.; in the remaining two years, 1891 and 1893, they were 916,000 qrs. and 1,037,000 qrs. respectively.

Among other Continental countries which compete in this trade are Germany, Holland, Denmark, and France; but the supplies from these sources fluctuate considerably, and have

seldom amounted in the aggregate to more than 360,000 qrs., the major part being provided by the first two countries.

The export trade in oats from Canada to the United Kingdom has been always more or less intermittent in character, and particularly so during the past decade. In 1892 Canadian oats figured in our import accounts to the amount of 669,000 qrs., while three years later the quantity credited to the Dominion was a mere trifle of 1,200 qrs. Similar fluctuations—though not so extreme—can be found in earlier years.

The recent acquisition by the United States of the premier position among our foreign purveyors of oats may justify a few observations on the principal features of the cultivation of the cereal in that country. According to the census of 1880, the area under this crop in the United States was then 16,000,000 acres, and the production from that acreage 50,000,000 qrs. Ten years later the land under oats had increased to 28,321,000 acres, and the production to 100,000,000 qrs. For an indication of the progress made since 1890, the last census year, recourse must be had to the estimates of the Department of Agriculture at Washington. These show that the extent of land devoted to oats apparently suffered little diminution until 1897, when the acreage was returned at 25,730,000 acres, and the total yield at 85,000,000 qrs. The principal States in which oats are cultivated are Illinois, Iowa, Wisconsin, Missouri, Minnesota, Nebraska, Kansas, Michigan, Ohio, Indiana, New York, and Pennsylvania. The average yield per acre for the entire country is about 26 bushels, though in some years over $31\frac{1}{2}$ bushels have been obtained. The average farm-price per bushel in 1897 is stated to have been $10\frac{1}{2}$ d. Rarely has the exportation of oats from the United States exceeded 1 per cent. of the crop, but in 1896-97 the ratio of exports to production was over 5 per cent. The total quantity, including oatmeal, sent out of the country in the year just mentioned was over 4,712,000 quarters, of which the United Kingdom took nearly two-thirds, while the greater part of the remainder was shipped to Belgium, France, Germany, and the Netherlands.

Russia's annual exports of oats have amounted in recent years to an average of about 6,250,000 quarters. Practically half of this quantity is shipped to British ports, and most of the remainder is distributed to Austria-Hungary and the four Continental countries mentioned in the preceding paragraph. It is estimated that the area devoted to the cultivation of oats in the 71 governments of the Russian Empire extends to 42,000,000 acres, from which an estimated crop of nearly 68,000,000 quarters was harvested last year.

In Sweden the acreage sown with oats is larger than that occupied by all the other cereals combined. During the past decade over 2,000,000 acres of land have been kept under this crop in that country, and the average annual production has been 7,500,000 quarters. For the same period, the average yearly exportation of oats from Sweden amounted to nearly 900,000 quarters, but this relatively high average is due to large shipments in some of the earlier years of the decade, for in no year since 1894 has the quantity exported exceeded 540,000 quarters. The United Kingdom purchases about seventy-five per cent of Sweden's exports of this cereal, and the greater part of the remainder is sold to Denmark.

The average value per quarter of the oats imported into the United Kingdom from all sources during the past ten years has ranged from 18s. 4d. in 1891, to 13s. 4d. per quarter in 1895, the range for British oats in the same period being from 20s. to 14s. 6d. The price of Swedish oats in our markets is usually between two and three shillings higher than that of the Russian and American varieties. The average import value of American oats in the past three years has been 13s. 1d. per quarter, while that of Russian oats has been 13s. 6d. per quarter. For the same three years, the average price of British oats was 15s. 5d. per quarter.

AGRICULTURAL HOLDINGS IN GERMANY.

As in 1882, so in 1895, there was included in the Occupations Census of the German Empire an inquiry into the size and modes of tenure of agricultural land.* In estimating the number and size of these holdings, the system adopted was so far similar to that employed in Great Britain that the holdings were classified according to their cultivated area, and not according to the total area. By cultivated area in the German returns is to be understood arable land, meadows, superior pastures, hop grounds, gardens,† and vineyards. The total area of these holdings was also enumerated, but such total applies only to those holdings which have some purely cultivated land; those which are purely forest, or uncultivated, were excluded from the present inquiry.

The number of holdings as thus defined was, in 1895, 5,556,900, their cultivated area 80,304,000 acres, and their total area 106,898,000 acres. On the average, therefore, each holding contained a cultivated area of 14·5 and a total area of 19·3 acres. In 1882 the corresponding figures were—holdings, 5,276,344; cultivated area, 78,716,000 acres; total area, 99,241,000 acres; average cultivated area, 14·9 acres; average total area, 18·8 acres. The number of holdings has thus increased by 5·3 per cent., the cultivated area by 2 per cent., and the total area by 7·7 per cent. But these increases are partly due to greater exactitude in ascertaining the areas, as the total area particularly, in 1882, would appear to have been affected by the omission of considerable areas of forest, which nevertheless comprised a small area of meadow or arable

* Vierteljahrshäfte zur Statistik des Deutschen Reichs, 1897, Ergänzungsheft zum 2ten Heft.

† But excluding pleasure gardens, even if an unimportant quantity of useful plants be also cultivated.

land. The number has also been increased to some extent by sub-division of holdings, in which legislation subsequent to 1882 has been a not unimportant factor.

An extremely minute sub-division of the holdings according to size has been adopted, the classification comprising no less than eighteen groups, the smallest referring to holdings under about twelve square yards. As may be imagined, the greater proportion of very small areas are gardens. A more convenient grouping is, however, obtained by dividing the holdings into five main classes. Thus grouped the number and area of the holdings in each group are as follows :—

Size of Holdings.	Holdings.	Agricultural Area.	Total Area.	Percentage of total.		
				No. of Holdings.	Agricultural Area.	Total Area.
	Number.	Acres.	Acres.	P.c.	P.c.	P.c.
Under 5 acres - -	3,235,169	4,465,000	5,966,000	58.22	5.56	5.59
Under 5 to 12½ acres -	1,016,239	8,116,000	10,230,000	18.29	10.11	9.57
Under 12½ to 50 acres -	998,701	24,011,000	30,966,000	17.97	29.90	28.96
Under 50 to 247 acres -	281,734	24,375,000	32,495,000	5.07	30.35	30.39
Under 247 acres and over	25,057	19,337,000	27,247,000	0.45	24.08	25.49
Total - -	5,556,900	80,304,000	106,898,000	100	100	100

This table brings out clearly how large a number of holdings are of very small area ; nearly 60 per cent. being under five acres in extent ; although the total cultivated area of these same holdings forms but $5\frac{1}{2}$ per cent. of the whole.

The relative changes since 1882 are somewhat variable, and not very striking ; the smallest farms have proportionally increased in number and decreased in area ; in the next category the process is reversed ; in medium farms both number and area have increased ; while large holdings have fallen both in number and area. Speaking roughly, therefore, there has been a slight tendency for the medium sized farms to increase at the expense of both the larger and smaller holdings.

As regards the modes of tenure of agricultural land in Germany, these are divided in the inquiry into six groups. The number of holdings occupied exclusively by the owner amounts to 40.68 per cent., while the number rented, whether wholly or only in part, amounts to another 46.91 percent. The other groups are small ; and include land of which the occupier takes a portion (usually half) of the raw produce (0.69 per

cent.); land occupied as part wages (8·16 per cent.); “service land” (1·96 per cent.); and communal lands (6·89 per cent.). It will be noticed that these percentages total up to more than 100; some of the holdings are therefore included in more than one category. The percentage of the total number of agricultural holdings which were held under the more usual methods of tenure, grouped according to size, may be given in the following table:—

Size of Holdings.	Percentage of Holdings in each class occupied by			
	Owner exclusively.	Tenant.		
		Wholly.	To the extent of more than half.	To the extent of less than half.
	Per cent.	Per cent.	Per cent.	Per cent.
Under 5 acres - -	31·18	25·68	11·65	14·32
5 to 12½ acres - -	43·62	4·64	9·42	35·49
12½ to 50 acres - -	58·53	1·97	5·10	28·83
50 to 247 acres - -	74·06	3·54	2·91	16·16
247 acres and over -	61·46	19·91	4·90	12·75
All holdings -	40·68	16·43	9·59	20·89

Some interesting points are brought out by this table. It appears that it is in the case of farms of 50 to 250 acres that the owners are most frequently found to be cultivating the whole of their holdings, and this occurs least often in the smallest areas. Holdings entirely farmed by the tenant, however, practically exist only in the smallest and the largest groups. A far greater proportion of the *area* is, however, farmed by the owners themselves, this amounting to no less than 86 per cent. of the total cultivated area, while nearly 12½ per cent. is tenanted. As with the number, the greatest proportion of rented areas are in the very small and very large holdings.

With respect to the methods of tenure not included in the above table, the most interesting point is that, of the plots under five acres, no less than 11 per cent. are occupied by servants as part of their wages.

It may be noted that since 1882 the number of rented holdings has increased by 12.2 per cent.; their area having augmented by 3.5 per cent. There is a very slight decline in the number of farms without any rented land, but an increase in their area of 8.3 per cent., so that, although there is an increase in the proportion of rented holdings, the percentage of the total area which is rented has declined.

A comparison of the size of holdings with the employment of the occupiers brings out clearly the unimportant character, from the purely farming point of view, of the very small holdings. Of the 1,852,205 holdings under an acre and a quarter no less than 43 per cent. are in the hands of persons whose chief occupation is described in the census as "industry" (mostly dependents); while the number in the hands of persons engaged in farming is 31 per cent., and of these just four-fifths are dependents. That is to say, that only 6 per cent. of the holdings under $1\frac{1}{4}$ acres are occupied by bread-winners whose main occupation is farming. If a further sub-division of these small areas is made, we find the percentage of farmers to be still lower in the smallest classes.

The extremely minute sub-division of holdings given in the German inquiry enables us to institute a comparison, with a very close degree of approximation, between the proportionate number of farms of various sizes in that empire and those of Great Britain, which are recorded in the "Returns as to the number and size of agricultural holdings" issued by the Board of Agriculture in 1896.* Such a comparison will much more nearly represent the actual facts than a similar comparison between this country and France, since the area forming the unit, both here and in Germany, is the cultivated, and not the total, area of the holding. The very small areas of one acre and less in Great Britain (of which there are 579,133) do not come into the category of agricultural holdings classified according to size; it is therefore necessary to omit the 1,852,205 holdings under $1\frac{1}{4}$ acres in Germany, this being the

* C.—8243.

nearest approximation to the one acre limit adopted here. The fact that the German holdings include also a relatively small number of gardens (not ornamental gardens), which are omitted from the British returns, will not materially affect the comparison; more especially as by far the greater number of such gardens are of very small area, and are therefore eliminated in an investigation into holdings of above one acre only.

Of the 3,704,695 German holdings which are of $1\frac{1}{4}$ acres and over there are 1,382,964, or 37·6 per cent., of less than five acres; as against 117,968 British holdings, or 22·7 per cent. in the corresponding group of holdings of above 1 and not exceeding 5 acres. The disproportion between the relative numbers of these small holdings in the two countries appears more striking if comparison be made of the areas; the German holdings of this group covering 4·5 per cent. of the total cultivated area, and the British only 1·1 per cent. This is not due to the greater average size of the German holdings of this class (which is only 2·6 acres against 3·1 in Great Britain) but to the much greater preponderance of large farms in this country, especially of those between 50 and 500 acres. This appears from the following table, exhibiting the number of holdings of over five acres :—

Size of Holdings.	Germany.		Great Britain.	
	Number.	Per cent.	Number.	Per cent.
5 to 50 acres - -	2,014,940	86·8	235,481	58·6
50 to 500 acres - -	292,982	12·6	161,438	40·1
Over 500 acres - -	13,809	0·6	5,219	1·3
Total - -	2,321,731	100	402,138	100

The cultivated area in the same groups of holdings is noted in the succeeding table, which brings the same features into stronger prominence. From this it will be noticed that farms of over 500 acres form a larger proportion of the cultivated surface of Germany than they do in Great Britain, and this although the average (cultivated) size of a

British holding (excluding those of 1 acre and less) is over $62\frac{1}{2}$ acres, while that of a German is $21\frac{1}{2}$.

Size of Holdings.	Germany.		Great Britain.	
	Acres.	Per cent.	Acres.	Per cent.
5-50 acres - -	32,126,000	42·3	4,533,000	14·1
50-500 acres - -	28,191,000	37·2	23,875,000	74·1
Over 500 acres -	15,522,000	20·5	3,803,000	11·8
Total - * -	75,839,000	100·	32,211,000	100·

Still more noticeable, however, are the differences in the method of tenure in the two countries. In the following classification of holdings to illustrate this feature, the third group does not represent absolutely the same persons in the two countries, in so far as, while the holdings in this group in Great Britain are “partly tenanted and partly owned,” in Germany they are partly tenanted and partly held under some other system. But these other systems of tenure are not in fact numerous, and almost all the land so held is in the holdings of less than 5 acres; it follows therefore that the very large majority of the partly tenanted holdings are, as with ourselves, partly tenanted and partly owned, and the comparison with the British returns may be taken as sufficiently accurate for practical purposes. The following table thus shows the proportion of holdings occupied by owner and tenant in three groups of areas:—

Tenure.	Germany.			Great Britain.		
	5-50 acres.	50-500 acres.	Over 500 acres.	5-50 acres.	50-500 acres.	Over 500 acres.
Occupied wholly by owner - -	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Occupied wholly by tenant - -	54·4	76·0	62·7	11·4	9·7	22·6
Occupied partly by tenant * -	3·5	4·2	22·3	84·2	85·9	69·1
	42·1	19·8	15·0	4·4	4·4	8·3
	100	100	100	100	100	100

The principal points brought out by the preceding table are the relatively small number of owners cultivating their land in Great Britain, and the large number of cases (particularly in the smaller classes) in which the German farmer rents a piece of land in addition to that actually belonging to him.

WHEAT CULTIVATION IN THE UNITED STATES.

The final report of the United States Department of Agriculture on the results of the harvest of 1897 contains some interesting observations by Mr. John Hyde, the Statistician of the Department, upon the progress of wheat cultivation in the United States. A special investigation instituted at the close of the harvest of 1897 showed the area under the cereal in question to have been in that year. 39,465,066 acres, and the total production 530,149,168 bushels.* It appears that the area actually harvested was nearly 5,000,000 acres more than had been reported to the Department by its correspondents as under cultivation, and the Statistician observes that as this under-estimate is believed to have been due in large part to under-estimates in previous years, no entirely satisfactory comparison can be made between the acreage and production in 1897 and those in 1896; but he states that an interesting comparison may be made between the figures for 1897 and those of the Eleventh Census, with which alone they are strictly comparable.

According to the published results of the Eleventh Census the total area under wheat in the United States in 1889 was 33,579,514 acres, or 5,885,552 acres less than the area devoted to this crop in 1897. The statistics of acreage and production for the two years compare as follows :—

Year.	Area.	Production.	Yield per acre in bushels.
	Acres.	Bushels.	
1889 - - -	33,579,514	468,373,968	13'95
1897 - - -	39,465,066	530,149,168	13'43

* Throughout this article the produce and exports are shown in Winchester bushels. The Winchester bushel is 0.97 of the Imperial bushel.

It is noteworthy that the increase in acreage in the foregoing statement is due to the extension of the wheat fields in the territory west of the Mississippi river, a process which has been a feature of American agriculture for the past fifteen years. There has been, as Mr. Hyde points out, a "continued westward movement of the centre of production," and "a continued tendency towards concentration." This expansion in the west has been accompanied by a contraction in the east, as may be seen from the following comparison of the acreage under wheat in the States, east and west of the Mississippi.

	1889.	1897.	Increase.	Decrease.
Eastern States - -	15,732,098	14,720,600	—	1,011,498
Western States - -	17,847,416	24,744,466	6,897,050	—
	33,579,514	39,465,066	5,885,552	—

In six of the States included in the eastern division, viz.: Pennsylvania, Maryland, Tennessee, West Virginia, Kentucky, and Michigan, the wheat acreage in 1897 was larger than in the census year. The aggregate increase was, however, only 377,462 acres, against a diminution of 1,388,960 acres in the remaining States in this region, leaving a net decrease of 1,011,498 acres as shown above; but it should be observed that this decrease is accounted for to some extent by the failure of the winter wheat crop in Illinois and Wisconsin, which led to a large proportion of the acreage in these States being ploughed up for other crops.

The enlargement recorded in the wheat area west of the Mississippi is due to an increased acreage in every State, with the single exception of Missouri, where there is a decrease of 380,000 acres. The States showing the largest increases are Kansas, 1,500,000 acres; Minnesota, 1,200,000 acres; Nebraska, 1,100,000 acres; Oregon and Oklahoma, 500,000 acres each; and Iowa, South Dakota, Washington, and California, 400,000 acres each.

Of the total area under wheat in the United States,

17,609,000 acres are situated in the seven north-central States of Minnesota, Iowa, Missouri, Kansas, Nebraska, South Dakota, and North Dakota, all of which lie west of the Mississippi, and 5,000,000 acres in the three Pacific Coast States of California, Oregon, and Washington. The principal wheat growing States east of the Mississippi are Pennsylvania, Ohio, Michigan, Indiana, Illinois, Kentucky, Tennessee, Wisconsin, Maryland, and Virginia.

The average yield per acre of wheat in the United States for the ten years 1887-1896 was only 12.7 bushels, the range being from 11.1 bushels in 1888 to 15.3 bushels in 1891. In the principal wheat-growing States the average produce per acre for the ten years averaged from 11.1 bushels to 13.7 bushels per acre, but in some of the more westerly and Pacific Coast States, as well as in the older States of the north-east, the yield per acre ranged from $15\frac{1}{2}$ to 20 bushels per acre, while, on the other hand, the south-central States east of the Mississippi have an average of under 10 bushels.

For the same decennial period the average yearly exportation of wheat, in the form of grain and flour, from the United States was 142,208,000 bushels, out of an estimated average crop of 464,093,443 bushels annually. The smallest annual export in that period was 88,600,743 bushels in 1888-9, when the crop was estimated at 415,868,000 bushels, while the largest was 225,665,812 bushels in 1891-2, when the total production of the country was estimated at 611,780,000 bushels.

A CLOVER FUNGUS.

(*Sclerotinia trifoliorum*, Erikss.; *Sclerotinia ciborioides*, Fries.)



FIG. 1.

1. Clover leaf attacked by the fungus. 2. Clover stem with leaves killed, showing a *Sclerotium* at the end. 3. *Sclerotia*. 4. *Sclerotium*, with funnel-shaped *apothecium* magnified.

The plants of several species of clover have suffered in various parts of the country this season from a disorder which was at first considered to be the ordinary clover "sickness," caused, as some hold, by the too frequent growth of clover in the same field, and, according to others, by the stem eelworm (*Tylenchus devastatrix*). Careful examination, however, disclosed characteristics which differed from those of ordinary clover "sickness," and were evidently attributable to the attack of a fungus which had not previously been noted in England. Mr. Carruthers, the Consulting Botanist of the Royal Agricultural Society, reported that this fungus is known as *Sclerotinia trifoliorum*, that he had found it

abundantly present in specimens of diseased plants submitted to him, and was decidedly of opinion that it was the cause of the affection. In the spring of 1898 it was seen that this disease had injured the clover plants in several localities. The winter was so very mild that the fungus received no check from frost and cold.

In some clover fields in different places examined in March, before the spring growth had commenced, the estimates of the percentage of clover plants destroyed by the fungus, or apparently destroyed by it, varied from 5 to 30 per cent. There were bare patches, more or less extensive, in some of these fields, while in others plants were dead, or dying, only here and there. In one field where hop plants had been recently grubbed, and where, therefore, its condition of fertility was very high and the clover plant very strong originally, the loss of plant seemed exceptionally great; and though it was seen in May that the plants which survived the attack of the fungus had spread in a luxuriant manner, and some of those actually attacked had thrown out new shoots, the crop was evidently reduced materially. In other fields, where the attack had been comparatively slight, the uninjured plants and those partially injured had spread widely after their manner, and occupied a good deal of the ground left bare by the failure of those badly infected. In most cases the loss of plants appeared small in May, compared with what was expected and indicated by appearances in February. To a casual observer the ground in many cases seemed as well covered as usual and likely to yield a good crop, but close investigation showed that weeds occupied some of the space between uninjured plants, in spite of their extraordinary efforts to extend their growth in every direction, intensified by the stimulating manures applied to them.

The attack seemed to be worse upon heavy soils, as these naturally have more moisture than sandy or light land. Professor Rostrup found this to be the case in Denmark, and that the best manured land especially suffered. He also found that the stronger and thicker the plant the greater and more severe was the injury. This experience also agrees with that recorded in England this year.

Though the actual loss from this fungus was generally less than it was assessed at in the early spring, there was a decrease in the yield of many clover fields, and it is feared by some that it may become more troublesome in the future and spread throughout the country in course of time. It has not been hitherto recorded as attacking clover plants in this country. Mr. Carruthers is the first authority who has identified it here, although it is believed by some that this is by no means its first appearance in Great Britain, and that abnormal climatic conditions have favoured its unusual development, and attracted attention to its mischief.

Red clover, alsike, and *Trifolium incarnatum* were found to be affected by this fungus, and the common yellow clover or trefoil (*Medicago lupulina*) was also infected. A case of injury to sainfoin was reported, and Mr. Carruthers also stated in his report to the Council of the Royal Agricultural Society that he had received sainfoin suffering from this attack. In France sainfoin is infected by *Sclerotinia trifoliorum*, according to a communication by Professor Prillieux in the "Bulletin de la Société Mycologique de France" for 1892, entitled "*Une maladie des sainfoins de la Charente Inférieure.*" Rehm, however, in his standard work on this subject, founded on careful research and experimentation*, says that sainfoin plants grown in experimental plots with infected clovers were not attacked by the fungus. Eriksson mentions sainfoin as one of its host plants in Sweden. Rostrup also includes sainfoin in the list of cultivated plants attacked by this *Sclerotinia* in Denmark, and Dr. Ritzema Bos relates that it appeared upon sainfoin plants at the experiment station at Wageningen, in Holland. It has been noticed that *Medicago lupulina*, the yellow trefoil, is especially attacked in this country. Rostrup remarks that this species of clover is the most infected in Denmark and recommends that it should be omitted from clover mixtures.† He found that, next to trefoil, red clover was most frequently attacked, then alsike, and that white clover was the least

* Die Entwicklungsgeschichte von *Peziza ciborioides*, Fries. Emil Rehm.

† *Tidsskrift for Landokonomie*.—Rostrup, 1890.

liable to be infected. Prillieux says that this fungus also injures lucerne and fenugreek.*

The first indications of the attack are brown spots upon the leaves, and sometimes on the leaf stems of the clover plants, towards the autumn of the year in which the clover seed was sown (Fig. 1, 1). In the case of *Trifolium incarnatum* these spots appear directly the plants have become established. The infected leaves and stems soon wither and die, and the root itself gradually decays in most cases. Sometimes only part of it dies and the remaining part throws out fresh shoots in the spring, but this growth is late and generally weak.

The examination of plants infected by *Sclerotinia trifoliorum* shows that they are infected by the branching mycelia of the fungus, which breaks down the parenchyma, or tissues, speedily causing the leaves and stems to wither and die. Tubeuf holds that as in the case of the allied species *Sclerotinia sclerotiorum*, instanced by De Bary, the mycelial threads of *Sclerotinia trifoliorum* give off a fluid which enters into and kills living plants. "This deadly fluid separated by the fungus contains as an essential constituent an enzyme soluble in acid solutions and capable of dissolving the cell walls; also a number of imperfectly known organic and inorganic salts, amongst which oxalates can certainly be proved."† If there is suitable moisture the mycelia are able to penetrate the exterior of their host plants and to attack other plants near them; as clover plants grow very closely together, the danger of infection being rapidly and extensively propagated is naturally very great. From these external mycelia sclerotia (Fig. 1, 3) are finally formed, either upon the leaves, or stems, or at the base of the stems (Fig. 1, 2), or below the crown of the roots; and according to Eriksson‡ and Rostrup§, the sclerotia often fall to the ground from the decayed stems. In infected fields of red clover investigated

* *Maladies des Plantes Agricoles*, by E. Prillieux.

† *Pflanzenkrankheiten durch kryptogame Parasiten verursacht*. Dr. Karl Freiherr von Tubeuf, 1895.

‡ *Om Klöfverröten*. Jakob Eriksson, 1880.

§ *Klovers Bagersvamp*. *Sclerotinia trifoliorum*. Docent E. Rostrup, 1890.

in March it was seen that the ground under the dead clover plants was covered with sclerotia of all sizes, protected from desiccation by the sun by the rotting remains of stems and leaves and by the thick growth of weeds around them. The sclerotia vary in size from that of a large rape seed to a large horse bean. Some sclerotia taken from young plants of *Trifolium incarnatum* were very small indeed. They are very dark grey, almost black in colour, but grey when cut through, and rather like india-rubber in texture when fresh and in moist surroundings. Moisture is necessary to preserve their vitality, for without it they quickly become lumps of black dust. Attempts

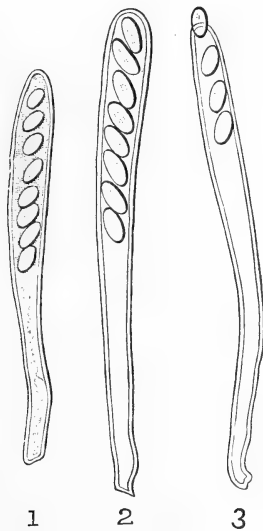


FIG. 2.

- 1 and 2. Asci with spores in various stages of development.
3. Ascus with spore escaping.

to cultivate them during the spring failed, though they were kept in damp moss and in an equable temperature. This is probably because the natural season for germination is the late summer. In ordinary conditions the sclerotia put forth reddish-brown apothecia, funnel-shaped with long stems. (Fig. 1, 4.) Rehm says this takes place about the middle of August. Within these apothecia are ranged long club-shaped asci (Fig. 2), or spore cases in each of which are eight spores, or, more correctly, ascospores. These are

elliptical, and when released from the asci may be carried by the wind or other agencies to clover plants far and near. Rehm describes the germination of the ascospores, and gives figures illustrating it in the work already cited. He shows in this interesting account that the ascospores, placed in water or in air saturated with moisture, swell and emit germ-tubes in four to six hours, which grow rapidly, and in twenty-four hours attain the length of the ascospores, and then begin to ramify. In some circumstances the branches develop very small globular sporidia at their extremities, occasionally isolated, but generally in files of four to eight. The germination of these sporidia has not been observed, but in all probability they also germinate in suitable conditions. In water containing proper nutritive elements the germ tubes from the ascospores form filaments of mycelium, and occasionally in the same cultures it is found that certain of the ascospores yield mycelium while others produce sporidia. Rehm succeeded in artificially infecting clover plants under glass, in a humid atmosphere, with *Sclerotinia trifoliorum*, by placing the apothecia upon their leaves. In six to eight days mycelium was formed within the leaves; the plants finally succumbed, and sclerotia were found at the crowns of the roots. Moisture is necessary for the germination of these spores. De Bary says: "It is estimated that at least 95 per cent. of the ripe ejected spores of *Sclerotinia ciborioides* lose their power of germination if they are kept dry in the air on glass plates for twelve days in a temperature of about 20 degrees C.*

According to Frank the sclerotia of *Sclerotinia trifoliorum* are able to remain in a dry state for two and a-half years without losing their power of germination.† This adds most materially to the chances of infection by this fungus, and indicates that it is essential for clover growers to avoid taking clover, sainfoin, and lucerne crops for long periods in or near fields where infection has occurred, as well as to modify the practice of letting clover leys remain down for two or more

* *The Comparative Morphology and Biology of The Fungi Mycetoza and Bacteria.* By A. De Bary; translated by Garnsey and Balfour. 1887.

† *Die Pilzparasitären Krankheiten der Pflanzen.* Dr. A. B. Frank. 1896.

years. The fact, also, that sclerotia are formed upon the roots of the clover plants, and are therefore supplied with moisture and able to germinate and send forth spores in due season, should lead to the ploughing-up of infected clover fields as soon as possible.

There is a conidial form of the fungus by which infection may be conveyed to clover and other host plants. This is the *Botrytis* or *Polyactis* form, which has not been specifically named, but is said by Rehm and other mycologists to exist, and to be a necessary stage in the life history of the fungus. *Botrytis cinerea* is the conidial form of the allied fungus *Sclerotinia Fückeliana*, which causes the "ripe-rot" of the grape. In this *Botrytis* form *Sclerotinia trifoliorum* passes through a stage of saprophytic existence upon the dead stems and foliage of clover, and other host plants, and on farmyard manure, in order to render it capable of parasitism. Upon this De Bary writes concerning *Sclerotinia sclerotiorum*:—"It may go through the whole course of its development as a saprophyte, and finds opportunity for this in the natural state on dead plants. But it can also attack living and healthy plants and parts of plants as a parasite, and destroy them. But according to our present experience it always requires to go through a previous stage of existence as a saprophyte in order to be capable of parasitism. The allied *Sclerotinia ciborioides*, which preys on clover plants, behaves in a somewhat similar manner."* Rehm, who is the chief authority on this fungus, speaks of its conidial form, though he does not define it as a *Botrytis*.

This clover disease was first seen in Germany, in Hesse, about 1857, and in Denmark in 1870. But the first scientific description of it was given by Kühn in 1870, in a paper published in the first number of *Hedwigia* for 1870, page 50, entitled, *Prof. Dr. Jul. Kühn, über die Sclerotienkrankheit des Klees*. Then Rehm recorded the results of his careful investigation in 1872 in his work, *Entwicklungsgeschichte von Peziza ciborioides*, which is still the standard work on this subject, and showed that the disease had done

* *Op cit.*, p. 380.

considerable harm in parts of Germany. Dr. Ritzema Bos says that it did harm in Holland in 1892 and 1893 in some districts of Groningen and Zeeland, and always on red clover. In 1893 it appeared suddenly in the Agricultural School grounds at Wageninen, both upon sandy and clay soils. In that year there was much disease in Holland from other species of *Sclerotinia*, upon rape, potatoes, hemp, and other plants. Dr. Ritzema Bos adds that it could not be discovered from whence this clover fungus came, unless "it arrived in the *Botrytis*, or conidial, form in which it exists saprophytically, upon manure." *

It seems that this disease has not spread in any very alarming degree in Holland, and is rather of a sporadic character, appearing and disappearing somewhat suddenly. In France, according to Prillieux, in districts where sainfoin forms the chief forage crop, this fungus is a veritable scourge to cultivators, and large bare patches are often seen in sainfoin fields.† Fenugreek is also similarly affected in the department of Gers. It is learnt from information courteously sent by M. Prillieux about the middle of April, 1898, that there had been no complaints as to injuries caused this year by the *Sclerotinia trifoliorum*. M. Petermann, the Director of the Station Agronomique de l'Etat at Gembloux, was good enough to report that *Sclerotinia trifoliorum* is not so general in Belgium as to be a real scourge to agriculture, yet it is often found in clover leys two or three years old. M. de Caluwé, Agronome de l'Etat, in answer to inquiries, kindly stated that clovers are very frequently attacked by this fungus in Belgium, but that they are not seriously injured in ordinary seasons, as the uninjured plants grow out and fill up vacant spaces. M. de Caluwé added that the malady extends throughout Belgium, upon sandy and dry soil, as well as in the polder districts. Professor Eriksson noticed this clover disorder in Sweden in 1878 9 and wrote

* *Kurze Mitteilungen über Pflanzenkrankheiten und Beschädigungen in den Niederländern in den Jahren 1892 und 1893*, Dr. J. Ritzema Bos.

† *Maladies des plantes agricoles*. Ed. Prillieux, Professeur a l'Institut national agronomique de France.

an account of it, describing it first as *Sclerotinia trifoliorum*.* He states that it was brought there with clover seeds, and it appears that it is periodically somewhat troublesome in that country. In Denmark it was originally observed in 1870 by Professor Rostrup, who has from time to time written concerning the fungus and its attacks, and, in 1890, contributed an illustrated article thereon to the *Ugeskrift for Landmænd*.† The Professor in courteous answer to a question in May, 1898, says: "It is everywhere in Denmark a very frequent and injurious parasite on clover." *Sclerotinia trifoliorum* was first discovered in the United States at the Agricultural Experiment Station of the Delaware College in 1889, when Mr. Chester, the mycologist at that station, stated that it was apparently new in that country, and furthermore that its stay was transitory, so that there was little time at disposal for intelligent observation.‡ Mr. Albert Woods, the acting Chief of the Division of Vegetable Physiology and Pathology of the United States Department of Agriculture, wrote in April, in answer to inquiries concerning *Sclerotinia trifoliorum* in America, that "the trouble has been observed quite often in this country and does considerable damage here."

From the evidence that is obtainable respecting the host plants of *Sclerotinia trifoliorum* it is clear that trefoil (*Medicago lupulina*), or "Black medick," is the most commonly infected. Red clover comes next to trefoil in liability to infection, while white clover is the least liable. Rostrup states that in Denmark trefoil, *Medicago lupulina*, or "gulklover," is especially subject to this attack, and advises that it should not be included in mixtures of seeds for clover leys.

As the attack has only been recognised recently in England, no estimate can be made of the liability of particular species here. It is certain, however, that red clover, alsike, and *Trifolium incarnatum* were alike infected. It was also noticed upon yellow trefoil (*Medicago lupulina*) in a pasture where this clover is usually most abundant.

* *Om Klöfverröten*. Jakob Eriksson. Stockholm, 1880.

† *Kloverens Bøgersvamp*. *Sclerotinia trifoliorum*. Docent E. Rostrup. Kjøbenhavn, 1890.

‡ *Sixth Report of the Agricultural Experiment Station of Delaware College, 1893*.

With regard to methods of preventing this attack, and remedies for it, it is recommended by most writers that clovers should not succeed clovers for several years where there has been infection. And where this disease has attacked young clovers, the ley should be ploughed up if possible after the first cut, and before the sclerotia send forth ascospores which may be carried by the wind to infect fresh fields. Professor Chester, of the Delaware College, remarks that, the fungus being one which only lives under shady, moist conditions, such as exist under dense growths like grass for hay, and clovers, and one which is soon destroyed by air and sunlight, it is evident that open cultivation and frequent stirring of the soil, such as prevail in the growth of corn, potatoes, tomatoes, and vegetables, will best enable the farmer to eradicate the fungus.* Since this fungus can live and propagate on so many species of leguminous plants, it is highly important to prevent the germination of the sclerotia and the development of the *Botrytis* form. Dr. Ritzema Bos advises that when clovers are seen to be infected in patches in the early stages of the disease, the diseased plants with the soil round and near them should be dug up and burned. It is desirable to keep trefoil out of mixtures, as strongly advised by Professor Rostrup. This is not by any means an indispensable clover. It is also advised by Rostrup and others that a good proportion of rye grass and other grasses should be sown with clovers when there is any fear of infection. When clovers are seen to be attacked it would be desirable to feed them off with sheep, and plough the land deeply after folding. Or the first cut might be made into hay, and the second growth folded off, and the land ploughed at once. There is no suggestion made by any writer on this fungus with regard to application, either in powdered or liquid form, of manures and remedies to prevent plants from infection, or to check its spread. Obviously, from its habits and life history, such applications would be inoperative, unless the plants were to be sprayed in the early autumn with a bouillie bordelaise; but the plants would be small at that date, and it would be

* *Op. cit.*, p. 110.

difficult to spray them efficaciously. The report of the experiments carried on at the Provincial Experimental Garden at Ghent in 1892-3 has just been received, and in this there is an account of the treatment of clover plants affected by *Sclerotinia trifoliorum*, with two copious sprayings of a 2 per cent. bouillie bordelaise. This had, however, no beneficial effect whatever.

The most important point to be decided concerning methods of preventing the propagation of this affection is as to the possibility of the infection being conveyed with the seeds of clovers and other host plants. In the report of the Danish Seed Control Station for the 25 years, 1871-96 there is an enumeration of insects and fungi in and among the seeds of corn, grasses, and clovers, and it is stated that the sclerotia of *Sclerotinia trifoliorum* were noticed among the seeds of red clover. It is quite possible that sclerotia of the fungus might be conveyed with the seeds of the plants. They are formed sometimes, and in some species of clover, upon the flower stalks. Rostrup shows this by the coloured figure illustrating his paper "Kloverens Bægersvamp," already cited, which shows the sclerotia of the fungus actually upon the leaves and close to the nearly ripe seed-pods of "gulklover" (*Medicago lupulina*). These sclerotia might easily get among seed when it is thrashed, and the smallest of them might pass through the screens and be sown with the seed, among which they would hardly be noticed, as it has been shown that they vary much in size, and some are hardly larger than clover seeds. Prillieux states that the sclerotia are found upon the leaf and flower stems of white clover and alsike.† Several samples of clover seeds were examined during the spring, but no sclerotia were distinguished. In one case the examination of a little of the seed left in the drill used for sowing a clover field where the fungus did much harm showed no traces of the sclerotia. It will be necessary to investigate clover seeds closely before they are sown, and to take all possible precautions against the spread of this insidious parasite.

* *Exposé des cultures expérimentales instituées au jardin provincial de Gand pendant l'année culturale, 1892-3.*—P. de Caluwé.

† *Maladies des plantes agricoles*, E. Prillieux, p. 419.

FOUR ALLIES OF THE WINTER MOTH.

The caterpillars of several other moths, besides those of the winter moth, cause harm to apple trees in the spring, when the leaves and blossoms are forming. In some seasons, when there is a bad attack, as many as four distinct species of caterpillars have been found devouring the foliage and bloom, in company with the winter moth caterpillars (*Cheimatobia brumata*). These last are considerably smaller than the other species found with them, and differ in colour from them, except perhaps in the case of the caterpillars of the *Anisopteryx æscularia*, though the green colour of these is more vivid than that of the Winter Moth caterpillars, and they are, besides, easily distinguished by their greater size and different shape. The four species found in the company of the Winter Moth* caterpillars are the "Mottled Umber" or "Great Winter Moth" (*Hybernia defoliaria*), the "Scarce Umber" (*Hybernia aurantiaria*), the "Pale Brindled Beauty" (*Phygalia pilosaria*), and the "March Moth" (*Anisopteryx æscularia*). There are two other moths whose caterpillars have been seen on apple trees in the spring, the "Belted Beauty" (*Nyssia zonaria*) and the "Small Brindled Beauty" (*Nyssia hispidaria*), but these are comparatively rare, and need not be described.

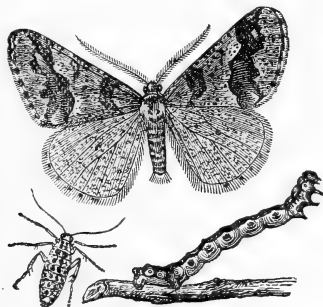
The males of all these species of moths are winged, and are bright and attractive in colour, while the females are dull coloured and wingless, or have mere rudimentary wings. The females crawl up fruit trees and other trees, and fruit bushes, and deposit eggs on the bark or twigs, from which caterpillars come in the early spring, just as the leaves shoot and the blossoms form.

* A description of the "Winter Moth" (*Cheimatobia brumata*), with methods of prevention and remedies, will be found in Leaflet No. 4, which may be obtained free of charge and post free, upon application to the Secretary, Board of Agriculture, 4, Whitehall Place, London, S.W.

The commonest of these is the "Great Winter Moth," or "Mottled Umber" (*Hybernia defoliaria*), also called the Leaf Stripper.

The male moth is large, having a wing expanse of over one and a half to one and three-quarter inches. Its forewings are yellowish, or light orange, dusted with dark brown, and have two thick dark wavy patches on each. The hind-

THE GREAT WINTER MOTH (*Hybernia defoliaria*).



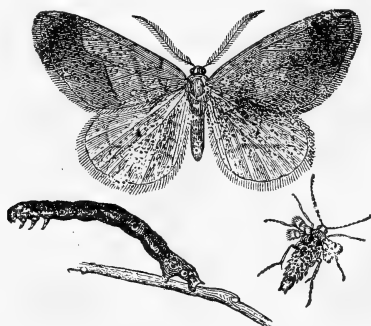
Male moth ; female moth, wingless ; caterpillar. All natural size.

wings are a duller yellow, with a very small central spot, and are dusted with light brown. The female has no signs of wings, and is ochreous, thickly covered with black spots. The winged male moths may be first seen in the twilight towards the end of October, flying round apple and other trees, and if careful search is made the wingless females can be found upon the ground under the trees, and upon their trunks. The date of the first appearance of these moths depends upon the weather, and in some seasons they may be noticed as late as December. The females, which can run quickly, go up the trees after pairing, and deposit long yellowish-white eggs, which become darker later, singly upon the shoots and twigs near the buds. A female will lay as many as 300 eggs. In the spring, as the buds begin to swell, the caterpillars are hatched, and immediately creep into them, feeding upon the leaves and blossoms as they form. The ten-footed caterpillars are slender, about an inch and a quarter long, and of a yellowish ground colour with chestnut brown markings. There is a succession of caterpillars up to the end of June. When fully fed the

caterpillars go into the earth and change to red-brown pupæ from which the moths come in October.

The Scarce Umber is by no means a scarce moth, judging from its numerous caterpillars found in some seasons on apple and other fruit trees. The wings of the male are from one to one and three-quarter inches across. It has yellowish brown fore-wings with a golden tinge, and dark transverse lines. The hind wings are yellowish grey, and the body gold.

THE SCARCE UMBER MOTH (*Hybernica aurantiaria*).



Male winged ; female wingless ; caterpillar. All natural size.

coloured. The female is greyish-brown, nearly half an inch long, with rudimentary winglets of a light grey colour, flecked with brown. It is more hairy than the female of the Mottled Umber. These moths appear towards the end of October, and may be seen as late as January if the winter is open. Greenish eggs, becoming darker in time, are laid upon the fruit spurs by the females, which run up the trees. The caterpillars are hatched when the buds swell, and commence feeding at once upon them. They are just over an inch long, slender in form, and of a purple brown colour, while the sides and under part of the body are yellowish.

The life history of this moth is practically the same as that of the Mottled Umber moth, and the injury occasioned by the caterpillars is quite as great.

The male of the Pale Brindled Beauty is a handsome moth, with wing expanse about $1\frac{1}{2}$ inches. The fore-wings are of a light mouse colour with greenish shadings, and somewhat undefined dark transverse lines, or bars. The hinder wings are of a rather paler hue, and the body is greyish with a

pronounced anal brush. The female is grey with very hairy legs, and quite without wings.

The perfect insect appears in January, and the greyish wingless female ascends the trees and lays eggs singly on the shoots. The egg is greenish, with brown dots, elliptical, and about the size of a poppy seed. The caterpillar is large, from $1\frac{1}{2}$ to $1\frac{3}{4}$ inches long, cylindrical, very stout, and of a rich-brown colour, with knobs and warts on several of the segments (those on the sixth and seventh segments are particularly large), and black bristly hairs. It pupates in the

THE PALE BRINDLED BEAUTY. (*Phygalia pilosaria*).



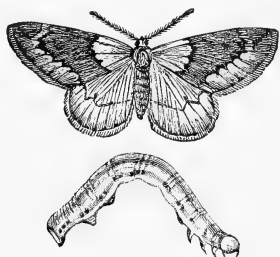
Winged male ; wingless female ; caterpillar. All natural size.

ground. There is a great resemblance between the caterpillar of this moth and that of the Small Brindled Beauty. The distinction between them as shown in Buckler's "*Larvæ of British Moths*" consists in the warts of the latter being larger and colouring mottled with orange.

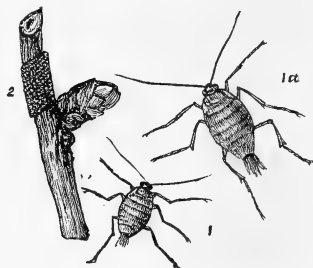
The March Moth is frequently abundant, and does much harm to fruit-trees and bushes of many kinds, and to filbert and cob-nut bushes. The female is wingless, brown in colour, with a conspicuous brush, or tuft of hairs, at the lower extremity of the body. The legs are very long. The male moth is about the size of the Winter Moth, with brown forewings streaked with a pale transverse ziz-zag line on the outer edges and a light fascia. The hind wings are somewhat lighter. The moths are first seen in March, and the female crawls up the trees and lays shining olive-brown,

barrel-shaped eggs in series of rings round the small twigs, as shown in Fig. 2. When the buds swell the caterpillars are ready to attack them. They are pale green in colour, with yellowish-green lines down the back, and greenish spots here and there about $1\frac{1}{2}$ inches long, and not unlike the Winter Moth caterpillars, but they are longer, of a more decided green, and not so thick as these. Like the caterpillars of the other moths described above, they pupate

THE MARCH MOTH (*Anisopteryx æscularia*).



Male Moth, natural size.
Caterpillar, natural size.



1. Female Moth, natural size.
1A, Female Moth.
2. Twig, with eggs.

in the ground, but the pupæ are enclosed in long oval earthen cocoons lined with silk. The pupa is brilliant brown with a green shade.

Prevention and Remedies.

The same methods of prevention as recommended for adoption against the Winter Moth must be adopted with regard to the four moths that have been described and figured above.

The most important of these is banding the trees with sticky substances to entrap the crawling wingless female moths and to prevent them from going up the trees to lay eggs upon them; or by putting an apparatus made of wood and tin or other materials to keep them back. Cart-grease put thickly on bands of grease-proof paper, like that used by grocers, is the best substance for this purpose. It should have no tar in it, as this injures the trees. In the case of old trees with thick bark, the roughest part of the bark must be scraped off to allow the bands of paper to be fitted close to the trees. Bands, made of old oilcake—or

manure—bags, smeared with sticky compositions, may be employed, but they must be fastened close round the stems or the moths will crawl under them. Hay bands can also be used, but there is nothing so effectual as the smeared grease-proof paper.

The band-traps or guards must be in working order by the middle of October, and they must be watched constantly, and grease applied where it has become dry or been rubbed off. It seems that this banding should be continued throughout the winter, and far on into the spring, as it has been shown that there is a succession of eggs laid by the various moths enumerated above from October up to the end of March. The moths, which lay eggs in the spring, are not so numerous as the Winter Moth, but a few of them are sufficient to produce swarms of caterpillars, which might cause serious injuries to the fruit crops. To keep bands in order from October to April is an expensive process, but some fruit growers do it and find that it answers. The guard employed by growers in the United States and Canada might be usefully adopted in this country, and though the initial cost would be greater than that of banding, the subsequent expense would be inconsiderable. This guard consists of a girdle of tin fastened so as to hang three or four inches out from the trunk of the tree, held there by a circle of fine sacking, or linen, and fixed by a cord, to which the sacking is sewn. The tin is smeared all round inside with an offensive substance applied by means of a small brush, which causes the insects to drop to the ground as soon as they come in contact with it.

Spraying the trees when the caterpillars are at work is most necessary. A few growers begin to spray directly the caterpillars are noticed. A still smaller number spray before caterpillars are seen, with Paris Green solution, consisting of 1 lb. of Paris Green to 220 gallons of water. This poisons the foliage and kills the tiny, delicate caterpillars, which at first are mere threads, hardly distinguishable without a glass.

Spraying with Paris Green may also be done later on, and until the apples are formed or have become of any size, but it would be unsafe to run the risk of the poison adhering to the

fruit. In America Paris Green is regularly and most advantageously used, even when the apples are of some size.

Quassia and soft soap solutions may be used at any time, not being poisonous. These do not poison the caterpillars, they merely make their food bitter and distasteful. They are put on usually in the proportion of 7 lbs. of quassia chips and 6 lbs. of soft soap to 100 gallons of water. Some growers use a much stronger quassia wash than this.

Spraying is the only really useful remedy for these caterpillars, and it must be repeated from time to time.

AGRICULTURAL AND MISCELLANEOUS NOTES.

INJURIOUS INSECTS AND THE FRUIT CROP OF 1898.

Among the most troublesome insects that have been a cause of complaint this year, the two species of *Otiorrhynchus*, *sulcatus* and *picipes*, have been rather prominent. The latter has been found abundantly in hop grounds in Worcestershire and Kent; the larvæ were injuring the roots among which they were feeding throughout the winter until March, and the beetles attacked the young vines directly they appeared.

Raspberry plants were also attacked in some localities. *Otiorrhynchus sulcatus* was found in strawberry beds, but the great quantity of rain during May forced on the plants quickly, so that they grew away from the beetles. Some improvement was effected in infested raspberry plantations and hop grounds by holding boards covered with tar near the plants and tapping them smartly with sticks to cause the beetles to fall into the tar. Frequent hoeings round the plants appeared to be of some benefit.

Aphides were extremely abundant upon plum and damson trees. Many growers sprayed the infested trees with soft soap and quassia, with much benefit. The blossom of these trees was unusually full, and a great crop was expected, but this has been diminished by the aphides, especially where the trees were not sprayed with strong quassia and soft soap solutions.

Aphides of all kinds have been numerous this year, probably on account of the very mild winter; they have been found materially injuring deodars and other conifers, and are also plentiful on apple, plum, and damson trees, currant bushes, hop plants, roses and other flowers.

In some places oats suffered from the attacks of the corn aphid, known as *Aphis granaria*, upon the blade, and it is

feared that the aphides will get into the flower glumes later on and lessen the yield.

Another reason for the increase of aphides is that the lady birds (*Coccinellæ*) remained in their hibernating refuges unusually late because of the cold wet spring. In the first week in June many lady-birds were still found in their winter retreats in crevices of walls, under the bark of trees, in the cornices of ceilings, in cracks of boards and barns and outhouses and other winter quarters.

Millipedes caused much mischief in some hop districts by eating the young hop shoots close to the stocks. Wireworms also did much injury in this way, but millipedes were distinctly identified in many cases. They were diverted in some degree by pieces of potato and mangel put close to the hills and examined at intervals, and the millipedes dislodged and destroyed. Wireworms have greatly damaged young mangel plants in many places by attacking them while quite young and small. Dressings of nitrate of soda and kainit did some good, but the very wet weather washed them away and the cold retarded the growth of the plants.

Innumerable caterpillars appeared in May upon the apple trees in many orchards and plantations, in some of which they seriously lessened the crop by devouring the leaves and blossoms. The caterpillars of the Winter Moth were, as they commonly are, the chief offenders, though they were accompanied by those of at least four other species of moths. Those growers who banded their trees properly suffered comparatively little, and those who sprayed them with quassia and soft soap, or Paris green, early and persistently, were but slightly affected.

The apple-sucker (*Psylla mali*) has been extremely plentiful in some apple orchards. It is so small that careful examination is needed to ascertain its presence. It is influenced to some extent by spraying with soft soap and quassia, and more so with Paris green, though its habit of getting between the innermost folds of the blossom serves to protect it from the effect of washes used to poison its food or make it distasteful.

The apple blossom weevil (*Anthonomus pomorum*) has been

busy in many apple trees, as usual, and though repeated washings had some influence in checking it, the habit, as in the case of *Psylla mali*, of the larvæ going to the heart of the blossom makes it difficult to reach them.

Although the apple blossom was very good, the cold, wet weather of May adversely influenced its "setting," and made the growth of leaves and blossoms slow, giving thereby opportunities to the caterpillars and other insects which beset the trees, so that the crop will be again short. The same influences militated against the crop of the plum and damson trees, whose blossom has rarely been so abundant or so beautiful, the trees being masses of white flowers. However, even after the disadvantages of cold and wet, and a very serious attack of aphides, it looks now (early in June) as if there would be nearly an average yield of damsons, but by no means a good return of plums.

The frosts in the early part of May, and the general inclemency of the season, so critical for their delicate blossoms, though these were abundant, were too much for pear trees, and their fruit will be extremely scarce.

Cherry trees were clothed as thickly as possible with blossoms, but will not give half a crop. In some cases the caterpillars of the cherry moth, *Argyresthia nitidella*, reduced the crop by getting into the tiny fruits and causing them to fall off, as described in this "Journal" for September, 1896. Among the "soft" fruits, gooseberries are abundant, and raspberries will give an average yield if the weather is suitable. Black currants have been injured by aphides and weather, so that the crop will be short, and the yield of red currants will not be of an average amount, while the strawberry crop, which promised to be very good, was affected by the cold spell in June, and may be disappointing.

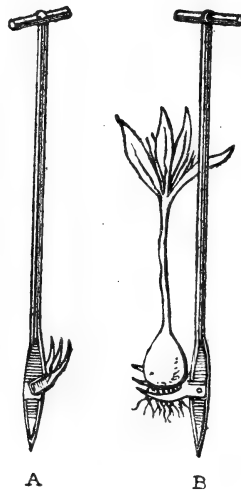
MEADOW SAFFRON (*Colchicum autumnale*).

Some complaints have been received lately as to the prevalence of this poisonous weed in meadows, and the difficulty of getting rid of it. It has also been stated

that bullocks were seriously injured by it, and recovered when they were removed from the meadow where it was plentiful. Meadow saffron grows from a "corm," or small bulb, of a chestnut colour, from which lilac-coloured flowers come in the autumn. At the base of the flowers, capsules, or seed vessels, are developed upon a long stalk in the spring, together with large dark green lanceolate leaves. This plant has most poisonous qualities. It is called kill-dog (Tue-chien) and kill-ox (Tue-bœuf) in France, and Cornevin in his valuable work, "*Des plantes vénéneuses*," says that it is sometimes injurious to horses, cattle, sheep, and pigs. The most dangerous period is from the end of April to the end of May, when the seed capsules have been sent up from the corms or bulbs, and the leaves are in full vigour; and at this season, when animals are first turned out, grass is sometimes very short, and they are most eager for green food, and are more likely to eat the meadow saffron. From the middle of September to the end of October, when the flowers are formed, there is also considerable danger to grazing animals, as at this time the grass is thick and the flowers might be taken up with the grass. This weed, however, has an acrid taste, and it is not very likely that animals would eat it except in eager haste to get green food, or if keep were very scarce, or again if taken up accidentally among thick grass. The bulbs have an unpleasant odour as well as an acrid taste, and would probably be rejected by animals, except, perhaps, hungry pigs. The greatest danger from this weed seems to be from the leaves and seed capsules getting into hay, as in this form its acrid flavour would be modified by the heating process, and if it were present in considerable quantities it might produce serious consequences.

Steps should be taken to eradicate this plant as far as possible. This can be done by digging up the bulbs, whose situation is easily seen by the pretty flowers without leaves in the autumn, or by the large green leaves and peculiar seed capsules in the spring. Where there is a large quantity of this weed, digging up the bulbs would be a tedious operation, at least, by the ordinary method of digging with

a spade or fork. A clever tool, shown in the figure, is used in France for extracting the bulbs in an expeditious manner. It consists simply of a rod of iron, enlarged at the end and sharply pointed like a pitcher for setting sheep folds; about ten inches from the end a movable claw with three prongs is fastened so that it may fold upwards, as in A, and allow this



TOOL FOR EXTRACTING BULBS OF MEADOW SAFFRON.

- A. Tool before being put into the earth.
B. Tool with bulb extracted.

pitcher to be thrust into the earth. When the claw is below the bulb the pitcher is drawn up so that the claw is extended and the bulb is brought with it.

Another mode of dealing with meadow saffron is to brush off the flowers in October with a sharp brush-hook, or the leaves and capsules early in May, close to the ground. If this is done for two years in succession the bulb will rot. Care must be taken to cut off every particle of the flower, seed capsules, and leaves. Another method would be to pull off the flowers, seed capsules, and leaves by hand. This would perhaps ensure a more perfect clearance of them, but it would be more expensive than brushing.

EXHAUSTED PASTURAGE IN THE UNITED STATES.

The United States Department of Agriculture has recently published information relating to the exhaustion of pastures in the south-west of the country, consequent on the effects of continued overstocking, and the mistakes which have been made in dealing with native grasses and other forage plants. One of the richest sections of central Texas is mentioned as a type of the conditions which obtain throughout a wide extent of territory, where thirty years ago large herds of buffaloes ranged almost undisturbed and small herds were still found as recently as 1877. The systematic settlement of the district in question commenced in 1883 with the advent of the railroad. All the settlers were engaged in stock-raising. The abundance and luxuriance of the native grasses were such as to support three hundred head of cattle per square mile, and the possibility of any of these grasses becoming extinct was not then considered. Nevertheless the carrying capacity of the land has steadily decreased, and it is an exceptional property that can now carry one head of stock to five acres. This rate is indeed stated to have been the average ten years ago, and the present opinion of the stockmen of the region is that the capacity to maintain stock on land, which could originally support five hundred cows to every square mile, has decreased so much that ten to twelve acres per cow is not an exceptional case, but the general rule. This result has been caused principally by overstocking the ranges, but the prairie dogs and jack rabbits have also damaged the land; and the best natural grass country in the United States has been almost destroyed. As regards remedies it is the popular belief that in order to recuperate and bring back the former luxuriant vegetation of the ranges the land merely requires rest. This is, however, not the view of the special agent in charge of the Government grass station at Abilene, in Texas. "Resting the range," he says, "will greatly help it, but something more must be done to bring it back to its original luxuriance, if indeed that is now possible." He adds, moreover, that the agriculturists of Texas are not different from those of other States in the matter of destroying grass. Not only has the stockman been reckless in this direction, but even the farmer has been his

ally. The latter still wages a war of extermination on the grasses which he finds growing in his fields; and breaks up the sod to make room for more cotton.

Some of the leading stockmen are, however, now dividing their holdings into winter and summer pastures, one being retained exclusively for winter use, and no stock being allowed to go into it until after the grasses have ripened and shed their seed; the other being used for spring and summer grazing. The stock is never allowed to run on any one pasture for more than sixty to ninety days. A case is mentioned where this treatment doubled the capacity of a pasture in two years, and the varieties of grasses were also very largely increased. There is, it is held, good reason to believe that by adopting this plan the pastures may in a few years be brought back to something like their original capacity for supporting stock.

The territory of Central Texas covers an area of 12,800,000 acres, of which one-half is agricultural, and the other half grazing land. It is estimated that ten acres on the average are now necessary for the annual support of every head of cattle, hence it follows that the number which the grass land can support is 640,000 head as compared with the 3,200,000 cattle which are estimated to have been sustained on these ranges in the year 1880. Taking the average market value of the stock cattle of Central Texas now at about £4 per head, the present capacity of the range, as regards the value of its cattle, is only £2,500,000 compared with £10,700,000 twenty years ago. If, it is added, the supposition is correct that it is yet practicable for the ranges throughout central Texas to be renewed to the extent of restoring it to its former capacity for maintaining stock, the above figures show the possible advantage to be secured, more especially as this condition of the ranges in question represents very fairly the state of affairs in all the grazing regions of the United States, excepting only those where the ranchman owns all the land, or controls it under lease for a term of years.

THE SHEEP INDUSTRY OF OREGON.

A bulletin recently issued by the United States Department of Agriculture contains some interesting details of the sheep grazing industry in the Cascade Mountains of Oregon. It appears that the first domesticated sheep were brought into Oregon from California in 1843, but from that year until 1860 sheep raising was only a small industry. About the latter date, however, wool began to assume considerable importance in the region as an agricultural product, and during the next thirty years the number of sheep kept in the State steadily increased. The growth of the industry may be judged from the following statement:—

Year.	Number of Sheep.	Value.	Pounds of wool produced.
		£	lbs.
1870 - - -	500,000	197,900	1,080,638
1880 - - -	1,265,100	384,800	5,718,524
1890 - - -	2,929,830	1,171,300	9,982,910
1895 - - -	2,529,759	613,700	12,038,091
1896 - - -	2,630,949	748,100	—
1897 - - -	2,604,640	720,700	—

The sheep consist for the most part of what are known as “range sheep,” that is, animals pastured or grazed on the great areas of unfenced public or Government land. Sheep thus maintained are placed under the charge of a herder each herder being entrusted with as many sheep as he can properly manage, commonly from two to three thousand. Such an aggregation of range sheep is called a “band.”

An account is given in the bulletin of the origin of the present grazing system in Oregon. Twenty years ago, the sheep that were owned on the treeless plains of eastern Oregon, at points remote from the forest-covered mountains, were pastured in autumn, winter, and spring, just as they now are, upon the open range; but during the hot and dry summer months, when on the summits of the plateaux the grass was dead, water for the sheep wanting, and the heat oppressive, it became imperative that the sheep should be kept in the deep rock-walled cañons forming the drainage channels of the region. Here were found water, fresh grass,

and shade which carried the sheep through the summer in good condition. But as sheep raising became more popular it was found that these cañons, on account of their limited area, could furnish summer pasture for only a portion of the sheep that could readily find winter pasturage. It was, therefore, necessary to increase the summer grazing, and this it was found possible to do by driving the sheep in late spring or early summer to some of the cool, well-watered, grassy, timber-covered mountains that adjoin the plains. By this modification of the yearly routine the possibilities of sheep raising on the plains were enormously increased.

With regard to the cost of maintaining a "band" of sheep, it is observed that under present conditions a sheep-owner with one or two flocks can seldom conduct his business profitably if he leads a nomadic life, and in general it is essential that an owner shall have for winter quarters a permanent ranche, with enough arable land to grow the fodder necessary for wintering his sheep. This represents a capital of from £1,000 to £1,200, whilst the cost of maintaining a band of about 2,000 ewes is estimated at approximately £430 per annum. Sheep-owners are accustomed to estimate that the cost of maintenance will be paid by the sale of the wool, while the annual increase in numbers represents probable profits. The sheep of eastern Oregon are chiefly of merino stock, but the increasing profitableness of good mutton has induced many owners to introduce Shropshire blood.

RUSSIAN AGRICULTURAL CREDIT ASSOCIATIONS.

The Russian Ministry of Finance has recently issued a report giving information as to the credit associations, from which accounts had been received up to 20 November, 1897. These consisted of 605 loan and deposit societies, 262 village banks, and 575 peasant-aid funds. There are also stated to be 59 loan and deposit societies and 146 village banks which did not furnish accounts. Information regarding these associations will be found in a previous number of this

Journal (Vol. I., page 181), but it may be stated briefly that the working capital of the loan and deposit societies consists of shares of about £5 each, which are subscribed by instalments. The societies accept deposits and make loans to members in proportion to their shares, whilst responsibility for engagements is guaranteed by all the shareholders. Village banks, which were established on their present basis in 1883, derive their capital from sums granted by peasant communities or private individuals. They are empowered to receive deposits and to borrow a sum not exceeding five times the capital fund. Loans are granted exclusively to peasants of the community which founded the bank to an amount not exceeding £20 for more than one year. The peasant-aid funds make loans to peasants on easy terms. Their capital was formed partly out of the capital placed at their disposal by the Ministry of Finance and partly out of the profits on the deposits made in the savings banks.

In 1896, the receipts of the peasant-aid funds amounted to £357,000, made up of deposits, repayments, and interest, whilst the deposits repaid and loans made by them amounted to £339,000. The outgoings of the village banks amounted to £264,000 and their income to £289,000. The operations of the 605 loan and deposit societies were on a much more extended scale, the loans repaid amounting to £3,165,000 and deposits to £621,000, the total receipts being £4,280,000. The loans granted during the year 1896 were £3,294,000 and the total outgoings were reported to amount to £4,323,000. The number of members in these societies is stated to be 201,843.

LIVE STOCK IN URUGUAY.

In a recent issue of *La Agricultura* it is stated that, according to the returns collected in connection with the land-tax, the number of cattle in Uruguay is estimated to amount to approximately 5,248,000 head; sheep to 14,334,000 head; horses to 388,000 head; and mules to 14,000 head.

The larger proportion of the horned stock consists of a

native breed, *criollos*, but foreign breeds for crossign have been, and are being, introduced in large numbers. Durhams are reported to be the most popular type of crosses, but Herefords are more frequently met with in the northern districts of the Republic. For dairy stock Dutch and Swiss cows are largely employed, while Jerseys and polled Angus are found in a few dairies.

Sheep breeding is an important industry in Uruguay. For the production of wool the native sheep have given place to merino crosses and pure-bred Spanish merinos; Rambouillets and Negrettis form now the nucleus of numerous flocks. The Lincoln, Romney Marsh, and Southdown, and crosses of these breeds, are largely used for the production of sheep for export.

The horses in the Republic are for the most part native bred; a few Percherons and Clydesdales have, however, been introduced.

THE ARGENTINE LIVE STOCK AND DAIRY INDUSTRIES.

In a report on the trade of the Argentine Republic during the year 1897, prepared by Mr. Laing, Her Majesty's Acting Consul-General at Buenos Ayres, it is stated that the United Kingdom is practically the only European country to which live stock and frozen meat are shipped from Argentina, the occasional shipments to French and Belgian ports being of very small consideration.

The figures quoted below, taken from official statistics, show the exports of live animals from Argentina during the year 1897 :—

Animals.	To Europe.		To Brazil.	To Other Countries.
	Continent.	United Kingdom.		
Steers - -	11,142	88,231	11,450	127,298
Wethers - -	101,764	375,809	1,159	25,396
Horses - -	614	—	1,148	11,853
Mules - -	—	—	1,587	14,730

It appears that an export trade in mules and horses is springing up with South Africa, several large shipments, comprising 2,921 horses and 6,958 mules, having been sent off during 1897, and it is held to be probable that further large consignments will be sent to replenish the farms in South Africa, which have suffered from the ravages caused by the "rinder-pest."

The production of butter is reported by Mr. Laing to be assuming large proportions in the Republic, whence over 15,000 cases are now exported annually, whereas a few years ago almost all the butter required for consumption was imported. The increasing production of home-made cheese is also said to be gradually driving out the imported article, which until quite recent years held the market in undisputed sway. It seems probable that the dairy industry has a great future before it in the Republic, as the supplies of milk and cream are abundant.

[*Foreign Office Report, Annual Series, No. 2044. Price 1½d.*]

PRODUCTION OF MILK IN SWEDEN.

According to an estimate made by Dr. Engström, the Director of the Dairy School at Alnarp, the total production of milk in Sweden in 1897 amounted to about 471 million gallons, the average yield per cow being taken at 314 gallons. The quantity of milk consumed in the raw state in that year is calculated to have been 172 million gallons; milk used for feeding calves and other animals accounted for 15 million gallons; and the remainder of the year's production, viz., 284 million gallons, was used for the manufacture of butter and cheese.

The number of dairies in Sweden engaged in the production of butter and cheese is stated to be 1,800. This number includes 945 estate dairies, of which 625 use only the milk produced on the estate, while 320 also employ purchased milk; 515 dairies owned by joint stock companies; and 340 co-operative dairies. It is estimated that of the 284 million

gallons of milk manufactured into butter and cheese last year about 145 million gallons were manipulated by the large dairies.

In 1897 over 467,000 cwts. of butter were exported from Sweden, while the imports of this article amounted to only 14,700 cwts. Prior to 1891 Sweden imported large quantities of butter from Finland, but this trade has almost ceased.

THE SUGAR INDUSTRY OF RUSSIA.

In a former number of this journal (Vol. II., Dec., 1895, p. 292) some account was given of the Russian sugar bounties, and it was stated that, subsequent to the abolition of the bounty, an ukase was issued on the 2nd July, 1895, with the object of controlling the amount of sugar thrown into the open market. Some further details as to the procedure adopted for this purpose, taken from Consul - General Stewart's report to the Foreign Office on the Agriculture of the Consular District of Odessa*, may now be given. It is stated that the Russian Government has now an office at Kieff, which has made the following rules:—Of the total product of the factories, 31,000,000 pouds (9,964,286 cwts.) of sugar crystals are yearly set aside for home consumption, and another 2,500,000 pouds (803,571 cwts.) as a reserve. Whenever inland prices at a station near Kieff rise during the months from September 1st to the end of December to 4r. 60 c. per poud (28s. 8d. per cwt.), or from January 1st to the end of August to 4r. 80 c. per poud (29s. 10d. per cwt.), then some portion of the reserve of 2,500,000 pouds (803,571 cwts.) are thrown on the market until the price of sugar comes down to the above-mentioned price.

All factories are allowed to include 60,000 pouds (or 19,286 cwts.) in the 31,000,000 pouds (9,964,286 cwts.) allowed for home consumption. If the quantity does not, at 60,000 pouds (19,286 cwts.) per factory, amount to 31,000,000 pouds (9,964,286 cwts.), then the factories producing more than 60,000 pouds (19,286 cwts.) of sugar are allowed to make up,

* *Annual Series, No. 2,023. Price 1½d.*

pro rata, from their factories the 31,000,000 pouds (9,964,286 cwts.) required to meet the home demand. The reserve stock of 2,500,000 pouds (803,571 cwts.) is then made up *pro rata* from the factories producing more than 60,000 pouds (19,286 cwts).

The factories producing more than 60,000 pouds (19,286 cwts.) must export all produce remaining on their hands after the above quantities have been made up. If they do not export the quantities left on their hands, then, instead of an excise of 1r. 75c. per poud (10s. 11d. per cwt.), which is levied on all sugar, a double excise of 3r. 50c. (21s. 10d. per cwt.) is levied on the quantity that should have been exported.

As sugar could, at the time of writing this report last year, only be exported at a loss, and as the drawback of 10s. 11d. per cwt. which is repaid on export does not cover the loss made by the sugar factories, the manufacturers do not care to export it themselves, but are often ready to pay the merchants an additional sum to cover the loss on exported sugar. The Odessa merchants who export sugar are being paid 1r. 75c. per poud (10s. 11d. per cwt.) as returned excise, and at present the sugar producers pay them 1r. 56c. (9s. 8d. per cwt.), in addition, so as to avoid the double excise which would be levied on the sugar left on their hands if they did not export it. The amount sugar manufacturers are ready to pay depends on the price of sugar in England, but they will pay any sum necessary below 1r. 75 c. (10s. 11d. per cwt.), the additional excise. The Russian Government do not at present, therefore, pay any bounty on sugar exported to Europe.

A few years ago about thirteen tons of beetroot were required to produce a ton of sugar; but by careful cultivation and the selection of seeds from the best sugar-producing sorts only, the quantity of beet necessary to produce a ton of sugar has been reduced to about eight and a-half or nine tons.

The greatest care is taken in Russia not merely to grow only the best varieties of beets from selected seed, but to prevent all waste in the manufacture of the sugar by having a professional chemist constantly on the spot.

The total acreage sown in 1897, according to information received up to September last, was given by the Russian Society of Sugar Manufacturers at 1,004,000 acres, which shows an increase over 1896 of 121,000 acres. This area was expected to yield 5,837,000 tons of beetroot, or an average of 116 cwts. per acre, as against 5,364,000 tons, or an average of 121 cwts. per acre in 1896.

The quantity of sugar which may be expected from the 1897 harvest is given as 612,000 tons, or 32,000 tons less than the forecast of September, 1896.

The last harvest, on an increased acreage of 121,000 acres, shows a corresponding increased yield of 473,000 tons of roots; but when the quantity of sugar expected to be produced is compared we find that, whereas one ton of sugar was produced from 8.3 tons of roots in 1896, it is very probable that 9.5 tons of the last crop will be required for the same quantity of sugar. The reserves of sugar having previously been considerably diminished, and — keeping in view the comparative increasing demand of the home market, as well as the necessity of setting aside the reserve stock prescribed by the imperial ukase—it is supposed that there will be a much smaller quantity available for export from the production of last year's harvest.

The yield of sugar in other beet-producing countries of Europe in 1897 was estimated to be considerably below that of the previous year, viz.: Germany, by 31,000 tons; Austria - Hungary, by 108,000 tons; Belgium, by 56,000 tons; and Holland, by 36,000 tons; while France was credited with 50,000 tons more than in 1896.

INSURANCE OF CATTLE IN GERMANY.

An appendix to the Report of the Royal Commission on Tuberculosis* contains an account, by some members of the Commission who visited Germany for the purposes of the inquiry, of the operations of certain societies in that country for the insurance of cattle destined for slaughter

* C. 8831. Price 3s. 11d.

and the payment of compensation for loss on condemnation. It must be remembered that abroad it is not the butcher, but the farmer, who suffers the loss from the confiscation of a carcase by the veterinary officer at the slaughter-house, as payment is not made by the butcher until after the expert examination has been made.

These insurance societies are of various kinds. In Leipzig the management is in the hands of the municipality, in Dresden of the Butchers' Union, and in Berlin of the cattle dealers. A number of public insurance offices also, in addition to a general insurance of cattle, undertake insurance against losses which may be sustained through the condemnation of cattle destined for slaughter. In the Grand Duchy of Baden a law was passed in 1890 for the compulsory insurance of cattle.

The private societies do not exist for the purpose of making a profit, but merely for covering the losses sustained by members. Tuberculosis is by far the most important disease involving the question of compensation for cattle condemned, and it is mainly, therefore, to protect themselves against seizures for this disease that farmers and cattle dealers have started these societies.

In Leipzig all cattle and pigs brought to market for slaughter must be insured, provided that the veterinary surgeon sees no reason in his examination of them prior to slaughter for excluding any. The premiums charged are, for oxen and bulls, 7s. 6d.; cows and heifers, 9s. 6d.; pigs, 1s. Compensation is given up to the full purchase price of the animal in addition to the slaughter-house charges.

These insurance societies have definite rules of management. In Dresden, for instance, the society is directed by a committee of management, drawn from selected members of the Butchers' Union, and the principal cattle dealers. Every member must insure all his cattle (unless found diseased or suspected prior to slaughter); and any person, not a member, desiring to insure his beasts, can do so upon payment of twice the ordinary premium. This premium varies from time to time, in accordance with the amount of the claims to be paid. In 1895 the premiums were, for oxen,

5s.; bulls, 6s.; cows and heifers, 8s.; having been raised from 3s. for oxen and bulls, and from 6s. for cows and heifers, which were the amounts in 1893. The insurance value is, after the payment of the premium, the purchase price of the animal. Compensation is also given for individual organs and portions of meat condemned, provided they are not too small. The compensation is paid in the case of animals that are removed from the market to be slaughtered elsewhere, if the seizure is made within five days.

In Leipzig, of the cattle coming to market in 1895 there were insured 19,866, of which 659 were condemned—553 of these as being not of full value, while the remaining 106 were to be destroyed. 96,635 pigs were also insured, 1,127 being condemned. The total compensation paid during the year was £18,719, while another £890 represented slaughter-house charges paid back. Premiums repaid amounted to £286 (the insurance having been cancelled), and expenses of management absorbed £252. The receipts were, £13,487 in premiums, £6,656 from sales of meat or animals not of full value, and £482 represented the proceeds of animals totally condemned.

At Dresden, 22,751 cattle were insured out of a total of 28,954 brought to market; the premiums were £5,566, the compensation paid £11,194. The sale of meat on the *Freibank** realised £4,486. In this instance the transactions of the society resulted in a loss, so that the compensation for livers has been lowered from 8s. to 6s., while the premiums have been raised as above noted.

LIVE STOCK IN GERMANY.

The following table shows the number of the different kinds of live stock in Germany, according to the results of a census taken on the 1st December, 1897, and reproduced in

* The carcases of animals condemned for tuberculosis in Germany may be steam-sterilised, and the meat so treated is then sold (under certain regulations) in a special building called the *Freibank*, where the quality of the meat must be indicated: its price is usually about half the market price.

the *Milch Zeitung* of 23rd April last, together with comparative figures for earlier years:—

Live Stock.	Jan., 1873.	Jan., 1883.	Dec., 1892.	Dec., 1897.
Horses - - - -	3,352,231	3,522,545	3,836,256	4,038,485
Cattle - - - -	15,776,702	15,786,764	17,555,694	18,490,772
Sheep - - - -	24,999,406	19,189,715	13,589,612	10,866,772
Swine - - - -	7,124,088	9,206,195	12,174,288	14,274,557

The most interesting feature of the table is the rapid and steady decline in the number of sheep, and the increase in the swine: whereas the former were in 1873 just three and a half times as numerous as the latter, their numbers were nearly equal twenty years later, and the swine are now over 30 per cent. more numerous than the sheep.

DANISH TUBERCULOSIS LAW.

The Board have received through the Foreign Office a translation of a law passed by the Danish Government with the object of combating tuberculosis in cattle.

Under this law, provision is to be made in the annual budget for £5,555 to be placed at the disposal of the Ministry of Agriculture in order to assist proprietors of beasts who wish to make use of tuberculin as a diagnostic means of combating tuberculosis among their cattle, provided that the injections are given in accordance with the regulations fixed by the Ministry. Part of the grant may also be given as a subvention to cattle-breeding associations with the same view.

Live cattle can only be imported *via* certain stations fixed by the Ministry of Agriculture. Immediately after importation the cattle are to be tested at quarantine stations with tuberculin by the veterinary police, such tests to be completed within five days of landing at latest. Animals which show no reaction may then be handed over to the owners for their free use; animals which have reacted must be either refused admittance or slaughtered under the direction of the veterinary police. The expense of establishing

the necessary quarantine stations and the cost of the tuberculin test will be defrayed by the Government.

Animals imported exclusively for slaughter need not be subjected to the tuberculin test nor placed in quarantine, but must, after being marked, be taken to a slaughter-house. They may, however, with the permission of the Ministry of Agriculture, and after marking, be taken direct to a cattle market under the control of the veterinary police; from the market they must be taken to the slaughter-house. Slaughter must follow within ten days of their arrival in Denmark.

The above provisions regulating the importation of cattle came into force on June 1st, 1898.

Cows attacked by tuberculosis of the udder must be slaughtered in accordance with the law. The proprietor receives as compensation one-fourth of the value of the carcass calculated according to the current price and its weight. If any portion of the meat is declared by the veterinary officer to be unfit for human food, the owner further receives one-half the value of such part.

Dairies will not be allowed to deliver milk or butter-milk as food for animals unless it has been previously heated to a temperature of 185 Fahr. ; but exceptions may be allowed if unforeseen accidents prevent such heating, though the customers must in that event be warned. This provision does not come into force until June 1st, 1899. When the churns are cleaned all slime must be burnt.

Milk and butter-milk may be imported from abroad only after satisfactory proof that such products have been heated to 185 deg. Fahr. The Ministry of Agriculture may dispense with this prohibition under special conditions.

Infractions of the law are punishable by fines, which go to the State. In the case of milk and butter-milk sold in contravention of these provisions the goods are confiscated, and the proceeds of the sale of these products go to the treasury of the Commune of Copenhagen, if the case is within the limits of that town, and to the poor-box in other localities.

EXPORTATION OF FLOUR FROM GERMANY.

The German Bundesrath on the 21st of February last adopted regulations with respect to the import and export of grain in connection with "transit" warehouses, and also providing for its admission free of duty upon exportation of flour to a corresponding amount. These regulations came into force on the 1st of March last.

Upon the exportation of wheat, spelt, rye, oats, pulse, barley, rape, and roots the exporter will upon demand receive a certificate entitling him to import a similar amount of the same kind of produce free of duty, provided that the quantity of any particular class of goods amounts to at least 500 kilogrammes net (about 1,100 lbs.). This certificate, or "import-permit" as it is called, will only be granted if the exported grain is of good merchantable quality.

Millers and maltsters can also obtain these import-permits, upon exportation of goods manufactured from corn or pulse, the quantity of material used in the preparation of such goods being not less than 500 kilogrammes net. The following rates of extraction are laid down for the purpose of calculating the equivalent amount of corn, viz.:—Flour from wheat 75 per cent.; flour from rye, 65 per cent.; malt from barley, 75 per cent.; malt from wheat, 78 per cent. For other products of this class the calculation of the rate of extraction will be determined by the officials in each case. The actual rate of extraction obtained in mills and malting-houses placed, by desire of their occupiers, under the permanent supervision of the revenue officers, may be adopted.

If an import-permit is claimed upon the exportation of wheat or rye-flour, without further specification, it is assumed that the meal has been extracted according to the rates laid down above. If the meal has been extracted at a higher rate, then the actual percentage must be declared; and the calculation of the amount of the raw material to be imported duty free depends upon this declaration, the accuracy of which must be demonstrated if necessary. Failure to comply with this provision renders the exporter liable to a penalty.

Import-permits will not be granted for the exportation of mixtures produced from various kinds of corn. Meal from hard wheat, or mixtures from soft and hard wheats, must always be declared as such, and are treated exceptionally.

Every holder of an import-permit is empowered, either, (a) within six months to import without payment of duty such a quantity of the class of corn specified as corresponds to the customs value noted on the document; or (b) after a delay of four months, and within the six months thereafter following, to pay in the import-permit, instead of cash, in discharge of the customs duties on certain specified goods mentioned below. No direct money payment will be made to the holder of the permit.

The goods alluded to in the last paragraph include certain kinds of timber, fruits from the tropics and warmer temperate regions, spices, rice, tea, coffee, cocoa, shell-fish, salted herrings, olive-oil, cotton-seed oil, blubber, mineral-oils, etc.

SPANISH TRADE IN AGRICULTURAL PRODUCE.

The total value of the export of merchandise from Spain amounted in 1896 to £38,727,400, whilst the imports were £33,699,300, the principal articles of commerce being metals (in ore and manufactured), wine, fruit, cotton, coal, timber, tobacco, and wheat. The countries from which the largest amounts of goods—so far as regards value—are imported are France, Great Britain, the Spanish West Indies, and the United States, though some trade is carried on with other countries of the European continent. The export trade is, for the most part, to the Spanish West Indies, France, and Great Britain, which absorb over three-fourths of the outward trade of Spain.

About a quarter of this trade may be classed as agricultural. The value of the animals of all kinds exported amounted to £1,089,700, and the imports to £927,700. The number of cattle exported was 40,000, and of sheep 224,000, together with 53,500 horses, asses, and mules. This trade is principally carried on with France and

Portugal over the frontiers, though a few animals of each species are stated to have been sent to this country. The export of raw skins and hides amounted to £372,700, of which £305,200 went to France, thus practically counterbalancing an importation of this class of goods of almost the same value from that country. Argentina also sent skins and hides to the value of £215,300: the total imports from all sources being valued at £658,400. The trade with the United Kingdom was small. The imports of wool (washed and unwashed) were unimportant, but 32,266,000 lbs. were exported, principally to the adjoining countries.

The export trade in meat, meat products, and fish (salted or fresh) amounted in value to £303,000, of which the Spanish West Indies took about £66,000, and the Philippines £7,200, principally in the form of hams and salted meat. Salted and dried fish was largely sold to Italy, while nearly all the remainder of the export was sent to France and other European countries. The imports of food under this heading amounted to £1,341,300, chiefly made up, however, of fresh and salted fish imported from Norway, France, and Great Britain.

The export of grain was insignificant, but that of wheat flour amounted to 1,135,900 cwts., of which 1,075,450 cwts. were sent to Cuba and Porto Rico, and 40,200 cwts. to the Philippines; 169,400 cwts. of pulse were also sent out of the country, six-sevenths of which went to the Spanish West Indies. Wheat was imported to the extent of 3,682,100 cwts., to which total Russia and Roumania contributed 3,269,300 cwts. The other cereals and pulse which entered the country amounted to 3,588,400 cwts.

The export of fruit, nuts, and vegetables from Spain amounted to a total value of £3,765,000, the principal articles included in this total being—

	£
Oranges - - - - -	1,636,300
Raisins - - - - -	598,640
Almonds - - - - -	407,600
Grapes - - - - -	310,500
Onions - - - - -	196,500

Out of 4,229,166 cwts. of Spanish oranges sold abroad, 3,113,400 cwts., of the value of £1,204,600, were sent to this

country. Great Britain was also Spain's largest customer for raisins and grapes, the combined export amounting to 547,400 cwts. out of a total of 969,100 cwts.; about 160,200 cwts. went to the United States and Canada. The export to the Spanish West Indies of fruits and vegetables of all kinds amounted to £132,256. The principal vegetable exports are onions, garlic and potatoes. The United Kingdom absorbed nearly the entire export of Spanish onions, no less than 889,000 cwts. coming to this country, out of a total of 964,900 cwts.

AGRICULTURAL EDUCATION IN SPAIN.*

Agricultural education in Spain falls within the province of the General Board of Agriculture, Industry, and Trade (one of the Departments of Public Works). There is also a technical board entitled "Superior Council of Agriculture" attached to the above.

Instruction in agricultural subjects is entrusted to the "agricultural engineers," who in practical matters have the assistance of experts. Agriculture also forms part of the ordinary curriculum in all the higher colleges, of which there are about fifty.

The General School of Agriculture is situated at Madrid, and it has attached to it the "Alfonso XII. Agricultural Institute," and the Central Farm at Moncloa. This school is intended for those who wish to gain the diploma of agricultural engineer. There is also a special school for experts. The instruction is both theoretical and practical, the latter being given exclusively at the experimental farms; and at the oenological and sericultural stations. Certificates of competency are given to those who have attended practical experiments and lectures and passed an examination. The principal Government farms and stations are the Central Farm of Moncloa, at Madrid, experimental farms at Saragossa, Barcelona, Corunna, Valencia, Caceres, and Jerez;

* Received through the Foreign Office.

œnological stations at Haro, Toro, Palencia, Ciudad Real, and Alicante; and a sericultural station at Murcia.

The sum expended annually by the Spanish Government on agricultural education, and in the payment of agricultural engineers, experts, foremen, etc., is £58,460. Grants are given on certain occasions to experts and to scientific men to study agriculture at home and abroad, and to attend exhibitions, congresses, etc. Grants are also made in aid of agricultural shows and the breeding of horses and cattle.

THE PRUSSIAN AGRICULTURAL BUDGET FOR 1898-1899.

A recent report on the Prussian Estimates for the year 1898-1899, by Mr. Spring Rice, Second Secretary of Her Majesty's Embassy at Berlin, contains some particulars of the estimated expenditure of the Ministry of Agriculture for 1898-1899. The receipts of the Department for the period in question are estimated at £94,000, and the ordinary expenditure at £767,874, a sum which includes the following items:—Central administration, £51,393; general commissions, £389,346; education, £126,708; promotion of animal breeding, £36,671; promotion of fish culture, £18,248; and improvements (draining, dyking, etc.), £104,915. The extraordinary expenditure is estimated at £184,774.

The general commissions are charged with the superintendence of the annuity banks ("*Rentengüter*" and "*Rentenbanken*") established under the law of 1891 for the purpose of advancing money to small farmers for the purchase of land. Money is advanced by the bank at 4 per cent.; $3\frac{1}{2}$ per cent. being interest on the loan, and the remaining one-half per cent. per annum serving to extinguish the debt in sixty years. Money is also advanced on the same terms for farming capital and buildings. The business of these commissions has greatly increased of late years. There are 9 presidents of commissions, with 119 secretaries, who are charged with the superintendence of questions connected with the division of former communal rights, and of property, and the assignment of charges on land, etc.

The sum of £126,708 for education includes £6,370 for the agricultural school in Berlin; £35,000 for the agricultural academy at Poppelsdorf; and £2,660 for the pomological school at Proskau. A subsidy of £20,000 is allocated to agricultural intermediate schools, and £14,000 is to serve as a fund for scientific or educational purposes; and there is an additional £55,530 for veterinary schools. Out of the vote of £36,671 for the promotion of animal breeding a grant of £10,500 is to be made towards prizes for horse races; £9,000 for prizes for stallions and mares for breeding purposes; and £15,000 for the encouragement of other branches of breeding. A further sum of £30,000 is put at the Minister's disposal for subsidies to agricultural societies, the promotion of arboriculture, and for various other purposes.

[*Foreign Office Report, Annual Series, No. 2042. Price 2d.*]

IMPORTATION OF BRITISH BREEDING STOCK INTO CANADA.

In the recently issued report of the Canadian Ministry of Agriculture for the year 1897, it is stated that the importation of pure-bred cattle from Great Britain into Canada stopped within the past ten years very largely on account of the dread of contagious pleuro-pneumonia and of the protective regulations which were considered to be necessary, but that as this disease is now almost unknown in Great Britain, and is dealt with in a prompt and energetic manner when discovered, the danger is reduced to a minimum. As, moreover, this disease is apparently only communicated by contact of living animals, and there is no danger from buildings or ships, the Canadian Department of Agriculture has consequently notified to steamship agents that they need not fear the risk of quarantine if they should carry stock affected by this disease; and a serious difficulty, which would-be importers experienced in getting cattle carried on steamships to Canada, has thus been removed.

To encourage Canadian importers, some of whom raised objections to re-testing their cattle in Canada before leaving

quarantine, it has been decided to accept the tuberculin tests made in Great Britain by a number of veterinarians in this country.

The want of pure-bred bulls throughout Canada is stated to be so urgent that it is held that every facility and encouragement should be made to importers.

THE PRICE OF BREAD.

In continuation of the statistics, which appeared in the "Labour Gazette" for November, 1896, and September, 1897, dealing with the rise in the price of bread at about those dates, returns have now been collected from 74 of the most important co-operative societies, with a weekly output of about 906,000 quartern loaves, showing the price of bread on April 5th, May 3rd, and May 10th, of this year.

The returns show that the average price of bread sold (excluding fancy bread) on April 5th was 5·81d. the 4 lb. loaf, and that by May 10th this had risen to 6·70d. The price at the beginning of April was somewhat higher than in September, 1897, when prices were considerably above those of 1896. The continuous character of the rise in price since 1896 up to the present time will be seen in the following summary, showing the average price of a 4 lb. loaf at the various dates in 1896-8, for which returns have been collected. The average price in 1893 is also given for comparison:—

AVERAGE PRICE OF 4 lb. LOAF—SUMMARY TABLE.

Average for 1893.	1896.			1897.		1898.		
	Sept. 12	Oct. 10	Nov. 7	Aug. 9	Sept. 6	April 5	May 3	May 10
d. 4·79	d. 4·22	d. 4·45	d. 4·85	d. 4·97	d. 5·68	d. 5·81	d. 6·15	d. 6·70

The table shows that between 1893 and September, 1896 the price per 4 lb. loaf fell about $\frac{1}{2}$ d. The aggregate rise between September, 1896, and the present time, is, roughly, $2\frac{1}{2}$ d. per quartern loaf. The greater part of this rise occurred between September, 1896, and September, 1897, when bread

rose nearly $1\frac{1}{2}$ d per quartern (1'46d.), the remaining 1'02d being accounted for by the rise between September, 1897, and the present time. The details for the different districts are shown in the following table for April 5th, May 3rd, and May 10th, 1898.

IB.—AVERAGE PRICE OF 4 lb. LOAF—DISTRICT TABLE.

District.	1898.			Increase per 4 lb. loaf over April prices on	
	April 5th.	May 3rd.	May 10th.	May 3rd.	May 10th.
	d.	d.	d.	d.	d.
North of England - - - -	5'82	6'44	6'75	0'62	0'93
Midland and Eastern Counties -	5'37	6'09	6'46	0'72	1'09
Home Counties - - - -	5'96	6'48	6'89	0'52	0'93
Southern and South-Western Counties	5'48	6'18	6'48	0'70	1'00
England - - - -	5'65	6'29	6'65	0'64	1'00
Scotland - - - -	5'97	6'01	6'77	0'04	0'80
Great Britain - - - -	5'81	6'16	6'70	0'35	0'89

WOODS AND FORESTS IN DENMARK.

According to the preliminary results of the inquiry undertaken in 1896 by the State Statistical Bureau at Copenhagen into the utilisation of the land in Denmark, the area occupied by forests and woods in Denmark in 1896 was 664,890 acres, as compared with 559,257 acres in 1888. The figures for the earlier year included a certain acreage under hedges and shelter plantations, while those for 1896 are exclusive of this acreage, which then amounted to 23,021 acres.

Of the area ascertained at the more recent inquiry to be under forests and woods, 262,687 acres were occupied by beech trees and 225,370 acres by conifers. Copse was credited with 17,555 acres, and 69,968 acres were returned as "land to be planted."

IMPORTS OF CIDER AND PERRY.

The imports of cider and perry into the United Kingdom were first distinguished in the annual statements of trade for 1893, when 558,108 gallons were imported, of the declared value of £23,814. In the following year the importation was 431,155 gallons, of the value of £17,309; in 1895 it rose to 603,190 gallons, valued at £21,826, but in 1896 it fell to 321,016 gallons, of the value of £11,036.

The bulk of the imported cider and perry consumed in the United Kingdom is produced in the United States, whence we received 307,816 gallons in 1896. France contributed to our supply 11,664 gallons, and the Channel Islands sent 851 gallons. The average declared value of the American cider and perry was about 8d. per gallon, while that of the French consignments was just over 1s. per gallon.

A FRENCH AGRICULTURAL CO-OPERATIVE SOCIETY.

In his last annual report to the Foreign Office, Mr. E. Cecil Hertslet, Her Majesty's Consul-General at Havre, states that the Agricultural Syndicate of Calvados, which has done good work since it was established in 1885, made a new departure in 1897, and founded a co-operative association under the title of the "Société Co-opérative Agricole Centrale de Normandie." The Society draws its members from all the agricultural syndicates of Calvados, and its objects are:—(1) To sell and purchase for its members all food stuffs used for man or beast; (2) to sell every kind of agricultural produce of its members; (3) to facilitate the direct exchange of farm produce between its members; (4) and by every means in its power to facilitate the direct relations between producer and consumer, so that both may profit by the suppression of the middleman's commission.

Mr. Hertslet, in describing the premises which the Society has recently opened, speaks of them being a miniature agricultural exhibition. The price list comprises every possible

article connected directly or indirectly with agriculture, from reapers to horse-rugs and cork-screws. The Society also undertakes the purchase of horses and cattle on behalf of members.

The secretary informed the British Consul that he would be glad to receive price lists of British manufacturers and samples of their products, and would be pleased to give them every information in his power.

[*Foreign Office Report, Annual Series, No. 2034. Price 2½d.*]

FRENCH IMPORT DUTIES ON HORSES.

By a law dated April 9th, 1898, the duties on horses imported into France have been considerably increased. Under the Tariff Law of 1892 horses of all kinds were subjected to a uniform rate of 24s. per head, and 16s. per head for colts. The new duties are as follows:—

Horses.	New Tariff.	
	General. Per Head.	Minimum. Per Head.
Stallions, geldings and mares, five years old and over - - - - -	£ 8	£ 6
Stallions, geldings and mares, under five years -	6	4
Colts - - - - -	3	2

The increase in the exports of British and Irish horses to France during the past few years renders the changes in the French duties of some importance to the interests of horse-breeders in this country. In 1897 these exports amounted in value to £305,886, the number of horses shipped having been 4,681. In the preceding year the shipments to France included 3,995 horses of British and Irish production, valued at £215,346, and 878 foreign and colonial horses of the declared value of £26,705.

The augmentation of the French duties is stated to have been made at the instance of the Normandy breeders, who

have been alarmed at the recent increase in the importation into France of horses from America, both directly and through England and Belgium.

FRENCH IMPORT DUTY ON PIGS.

The duties on pigs, pork, and certain allied products imported into France have been raised by a law dated April 5th, 1898. The tariff is now as follows; Pigs, 4s. 10d. per cwt., live weight; young pigs weighing 55 lbs. or under, 2s. 5d. per head; fresh pork, 7s. 4d. per cwt. The above rates are the general tariff, and no minimum tariff is quoted. Charcuterie is to be charged £2 os. 9d. per cwt. general tariff, and half this rate for the minimum duty; and lard, 16s. 3½d. per cwt. maximum tariff, and 10s. 2d. minimum tariff. Lard which is intended for industrial purposes is admitted free, provided that it is mixed with some other kind of grease and denaturised under the superintendence of the Customs authorities.

The following information has been received through the Foreign Office:—The French Government have suppressed, as from the 4th May until the 30th June, 1898 (both dates inclusive), the import duty upon wheat in grain. The full duty of seven francs (12s. 2d. per quarter) will be levied on and after the 1st July next.

**Suspension of
Wheat Duties in
France, Italy,
and Spain.**

With reference to the note in the last number of the Journal (p. 514), the Italian Government has now decided to suspend altogether, by decree issued on the 4th May last, the import duty on wheat until the 30th June next.

With reference to the recent abatement of the Spanish import duty on wheat, quoted in the last number of the Journal (p. 520), the Government of Spain have by Royal Order in the *Gazette* of the 7th May last, removed all import duties from wheat, maize, barley, rye, rice, and other cereals, potatoes, beans, and all kinds of flour; and have further prohibited the exportation of these articles until the 15th

August of the present year, exception being made of maize and maize flour, the exportation of which is prohibited until the 15th November. The prohibition to export barley was, however, suspended on June 1st.

The Journal of the Agricultural Society of Moscow has recently published information relating to the efforts which have been made during late years to export sheep from Russia into France. The trade commenced in the year 1889, when the French Government permitted the landing of Russian sheep at the Mediterranean ports. The imports amounted to 28,000 head in 1894, to 34,000 in 1895, and to 27,000 in 1896. The animals are obtained principally in the northern districts of the Caucasus, and they are shipped from Odessa and Nikolaieff. The financial results of the industry do not appear to have been very successful hitherto, owing, it is stated, to the difficulties which generally accompany a new industry. More recently, however, efforts have been made by the Russian flock-masters to obtain better results. A small party was appointed to accompany a consignment of 4,500 merino sheep which were exported by nine breeders in the spring of 1897. The voyage to Marseilles lasted ten days, and only a few casualties occurred at sea. The animals did not lose much in weight and their average was 100 lbs. on arrival in France. The average cost, including carriage, of the sheep amounted to 16s. 8d. per head, and a certain number of them were sold for 30s. 4d., while others realised only 20s. 10d. per head. It is, however, estimated that the transport charges can be reduced by half a crown per head, and that carefully selected animals will compete successfully in the French market with Algerian mutton, the French sheep itself being considered much superior by reason of its weight, early maturity, and the quality of its flesh.

**Meat Export
from Denmark
and Sweden.**

The increasing difficulties in the way of the live cattle export from Denmark to Germany have caused attention to be directed to some other means of disposing of the surplus production of meat in Denmark. For this purpose, and with the object of exporting dead meat on a larger scale, principally to England, the Government have, it is stated, granted £11,000 for the establishment of export slaughter-houses. Some of the bacon factories have already been extended so as to receive cattle for slaughter, dressing, and export, both branches of the business being carried on under joint management. Under certain conditions the Government will refund to such factories the expense of extending or rebuilding their premises. It is also proposed to erect special slaughter-houses for cattle at Esbjerg and Frederikshavn.

Farmers in Sweden have also addressed a petition to their Government to take similar action and to grant an amount of £27,700 for the establishment of export slaughter-houses in that country.

(Smør-Tidende.)

**Horse-Breeding
in Prussia.**

A report published by the Foreign Office relating to the Prussian Estimates for the current year contains some information relating to the Government horse-breeding establishments in that country. There are four large central stations of this class in Prussia, with eighteen depôts for stallions for use in country districts. The principal station at Trakehnen occupies 10,394 acres, and the stud comprises 1,300 to 1,400 horses and 15 principal stallions, of which 8 are thoroughbreds. The staff consists of 27 principal officials with 350 assistants, horse-breakers, and labourers. The total number of stallions in the main establishments is 31, with 670 brood mares and 1,910 young horses. In the country stations stallions only are kept (2,748 in number) for the use of the neighbouring districts. The receipts in these establishments for covering fees are estimated at £90,000,

and the deficit, to be met by the Government, is put at £39,000 on the working expenses.

The total receipts from the horse-breeding establishments are given as £134,153, and the expenditure as £311,576, thus leaving a total deficit, to be met by the Government, of £177,000. The Government imposes severe regulations as to the employment of private stallions, which have to be passed by the competent officials before use. The horse-breeding establishments have no connection with the Army administration, which buys its horses in the open market.

[*Foreign Office Report, Annual Series, No. 2042. Price 2d.*]

The French *Journal Officiel* has published a copy of a Law dated the 9th April, 1898, raising the duties

**French
Margarine and
Butter Duties.**

on margarine and similar substances and also on butter. The duties on margarine by the maximum and minimum tariffs of

the Law of 1892 were 8s. 2d. and 6s. 1d. per cwt., these are now raised to 14s. 3d. and 10s. 2d. respectively. The duty on butter has been increased from 5s. 4d. and 2s. 5d. to 12s. 3d. and 8s. 2d. per cwt.

According to a Foreign Office Despatch, the reason for the change is, it appears, the high rate of duty existing in Germany since 1879, and also the increased duties recently voted in Belgium and Switzerland. It is also alleged that the Margarine Law of April, 1897*, imposed such hard conditions upon the margarine manufacturers in France that the cost of production has been largely increased, and the manufacturers placed at a great disadvantage as compared with their foreign rivals.

According to the *Ugeskrift for Landmaend*, the net exports of butter, bacon, and eggs from Denmark

**Danish .
Butter Exports
in 1897.**

in 1897 amounted in value to £8,500,000. The value of the gross exports was £10,400,000, of which £10,000,000 was

accounted for by shipments to the United Kingdom. The

* See Journal, Vol IV., p. 85.

butter, bacon, and eggs of Danish production sold to Great Britain in 1897 are estimated to have constituted 56 per cent. of the value of the total exports of all kinds of goods from Denmark in that year. In commenting upon these figures, the *Smør-Tidende* states that out of a gross export of 145,000,000 lbs. of butter, more than 112,000,000 lbs. consisted of Danish produce, the remainder being made up of butter, chiefly of Swedish or Finnish origin, landed in Denmark, and re-shipped to foreign countries, while consignments of about 5,260,000 lbs. were merely trans-shipped in Danish ports without being landed.

The net export of butter from Denmark in 1897 amounted to 105,000,000 lbs. of the value of £5,000,000, as compared with 97,500,000 lbs., valued at £4,600,000 in the previous year.

The British Consul at Venice states in his last report to the Foreign Office that certain formalities are required before plants and bulbs from the United Kingdom can be introduced into Italy, as the Italian Customs authorities have no power to permit the introduction of such plants because Great Britain did not join the Berne International Phylloxera Convention. Some time ago a British subject, resident in the Venice district, had some gardenias sent out to him from England. When the plants arrived it was found necessary to write home for the required certificate of origin, and on application to the Italian Minister of Agriculture the permission asked for was granted, but, in consequence of the delay, the plants arrived at their destination in a state of decay. It is therefore suggested that exporters from Great Britain to Italy should ascertain beforehand whether the plants or bulbs will be cleared on arrival at their destination, if accompanied by a proper certificate of origin.

[*Foreign Office Report, Annual Series, No. 2,037, Price 1½d.*]

The Board have received, through the Colonial Office, a copy of a Tasmanian Act, dated 24th December, 1897, providing for the constitution of a Department of Agriculture in that Colony. In addition to the ordinary functions of an agricultural department, there are specified among its powers and duties the employment of persons to inspect and report upon exported agricultural produce, upon the request of the exporters and upon payment of a fee ; and the advertisement from time to time of the products and advantages of the Colony in other countries.

**Tasmanian
Agricultural
Department.**

The last report of the Minister of Agriculture for the Dominion of Canada contains a reference to certain trial shipments of fruit, consisting principally of the more tender varieties—such as peaches, pears, tomatoes, and grapes—which were sent to the United Kingdom in 1897. The general results of the trial shipments indicate that the first consignments, consisting chiefly of peaches and pears, were packed in cases which were too large and without sufficient provision for ventilation. When the cases were placed in the cold-storage building, specially built at Grimsby, Ontario, the heat generated by the fruit in a large measure counterbalanced the cooling power of the ice. The tender fruit was moreover practically insulated by the packing material employed ; it remained comparatively warm in the middle of the packages, and consequently ripened too much before it was landed. Later shipments, consisting of peaches, pears, tomatoes, and grapes, however, arrived in good condition, but the British consumers are stated to have not yet learned to like the flavour of Canadian grapes, or to pay such a price for them as would permit of a remunerative export trade. The prices at which grapes in good condition and of fine quality were sold were, indeed, insufficient to meet the cost of carriage, thus leaving the value of the fruit itself, the cost of the cases, and the expenses of packing to be borne by the department. The information obtained was apparently sufficient to indicate how tender fruits may be exported from

**Canadian Fruit
Exports.**

Canada without deterioration in quality, and it is held to be more than probable that a large and profitable export trade may hereafter be developed.

It is reported by H.M. Vice-Consul at Galatz, that the Roumanian Parliament will shortly be asked to sanction the construction of grain silos at the railway stations situated in the agricultural districts. In these stores there will be a classification of the grain according to quality and kind. They are first to be tried in Moldavia. Their holding capacity will be about 60,000 to 65,000 tons, so that including the grain silos now existing in the docks of Braila and Galatz, there will be a total storage capacity of 400,000 tons of grain in the country. The cost of construction is roughly calculated at £110,000.

[*Foreign Office Report, Annual Series. No. 2,100. Price 1d.*]

According to the *Annuaire des Syndicats Professionnels* for 1897, published by the French Ministry of Commerce, the number of agricultural co-operative associations (*syndicats agricoles*) existing in France on July 1st, 1897 was 1,371, with a membership of nearly 600,000 persons.

This exhibition, which was announced in the last number of this Journal to be held in the course of the present year, has now been postponed until April, 1899, as the project has assumed dimensions necessitating an extension of the programme.

**Ornithological
Exhibition at
St. Petersburg.**

Some information as to the trade of the United States with Cuba has been recently published by the American Department of Agriculture, from which it appears that while the trade up to the year 1893

**United States
Trade
with Cuba.**

showed a steady increase, there has been since that year a considerable decline. The imports from Cuba have generally been much in excess of the exports to that island, the balance of trade being decidedly against the United States. During the ten years 1887-1896 the value of the merchandise imported averaged £12,327,000 per annum, and that of the merchandise exported only £2,920,000. Among the products imported from Cuba to the United States, sugar is by far the most important, constituting more than 75 per cent. of the total value; the other agricultural products include leaf tobacco, fruit and nuts, hides and skins, bones, beeswax, honey, vegetables and vegetable fibres. Of the exports to Cuba from the States, about 45 per cent. have during the past five years been agricultural, the most important items being lard and breadstuffs, which make up nearly three-fourths of the total. The breadstuff export was chiefly wheat flour, with some maize; in the year 1893 the total value amounted to £732,000. The other agricultural exports are potatoes, vegetables, and dairy products.

REPORTS ON FOREIGN CROPS.

THE UNITED STATES CROP OF 1898.

A telegraphic summary in *The Times* states that the Statistician of the United States Department of Agriculture, in his report of June 10th, puts the acreage under wheat at 43,000,000 acres, or 8 per cent. more than the 39,465,000 acres which are the officially revised figures for 1897. In 1895 and 1896 the acreage was estimated at between 34 and 35 million acres. Of the total in 1897, 26,200,000 acres are under winter wheat, and the remaining 16,800,000 under spring wheat. These figures are stated to be liable to revision, particularly as regards spring wheat in the two Dakotas.

The average condition of winter wheat is put at 90·8, the highest June average since 1891, and this in spite of one of the chief States (California) reporting a figure of 33 only. The average of spring wheat is given as 100·9, a figure almost, if not entirely, unprecedented.

The total acreage under oats is estimated to be 25,300,000 acres, as compared with 25,730,375 last year; the average condition of the oat crop is 98, or 9 points higher than at the same period of last year. The barley acreage is estimated to be 2,575,000 acres, or 5·3 per cent. less than 1897, when it was 2,719,116 acres.

The United States Harvest of 1897.

The United States Department of Agriculture issued early in May the final Report of the Statistician of the Department, Mr. John Hyde, on the crops of 1897; and from this the following statement has been compiled, showing the acreage

and production of the several crops in the United States in 1897 and 1896. It should be noted that in the case of wheat the figures for 1897 are the results of a special investigation made at the close of the harvest, and the Statistician states that no entirely satisfactory comparison can be made between the statistics of acreage and production of the year in 1897 and those for 1896, as it is believed that the returns for earlier years were under-estimated (see page 36).

Crop.	Acreage.		Production in Winchester Bushels.	
	1897.	1896.	1897.	1896.
	Acres.	Acres.		
Maize - - -	80,095,051	81,027,156	1,902,967,933	2,283,875,165
Wheat - - -	39,465,066	—	530,149,168	—
Oats - - -	25,730,375	27,565,985	698,767,809	707,346,404
Barley - - -	2,719,116	2,950,539	66,685,127	69,695,223
Rye - - -	1,703,561	1,831,201	27,363,324	24,369,047
Buckwheat - -	717,836	754,898	14,997,451	14,089,783
Potatoes - - -	2,534,577	2,767,465	164,015,964 Tons.	252,234,510 Tons.
Hay - - -	42,426,770	43,259,756	60,664,876	59,282,158

With respect to the reduced production of maize in 1897, it is pointed out that the crop of 1896 was the largest on record, and that even the diminished yield of 1897 is over 100 million bushels in excess of the average of the last ten years. The average value per bushel of the crop is given as 13d., this being the highest average since 1894, and 1 $\frac{3}{4}$ d. per bushel higher than the average for 1896.

The average yield per acre of wheat in 1897 for the entire country was 13·4 bushels, this being 0·7 bushels per acre higher than the average for the previous ten years, but of the seven States having 2,000,000 acres or more in wheat, all but two produced a crop from 0·3 to 3·7 bushels per acre below their ten year average, and had these five States, together with Illinois and Missouri, had average crops, the total wheat crop of the country would have been nearly 50,000,000 bushels greater than it was. The total value of the wheat crop is given as £89,285,000, or 3s. 4 $\frac{1}{4}$ d. per bushel, this being the highest average since 1891.

The crop of oats in 1897 has been exceeded five times during the past ten years, the crops of the remaining years falling from 36,000,000 bushels to 175,000,000 bushels below that of last year. The average value per bushel was 10½d. or 1¼d. higher than the average for 1896.

The potato crop was to a very large extent a failure except on the Pacific coast; with the exception of Rhode Island, which reported a yield of 110 bushels per acre, all the States with more than 100 bushels per acre lie west of the Mississippi River, and all except Minnesota are in the Rocky Mountain region or on the Pacific coast.

Hay was cut from 832,986 acres less than in 1896; but the average yield per acre, 1·43 tons, was 0·23 ton greater than the average for the last ten years, and is the largest ever recorded by the Department, except in the year 1878, when it was 1·47 tons.

CROPS IN INDIA.

In the Second General Memorandum on the wheat crop of India, published in March last, it is stated that in reviewing the wheat harvest of the present season, 1897-98, the country may be separated off into two great regions, differing from each other materially in the area sown and the result of the crop. In Northern India, which region may be taken for the present purpose to comprise Sind, the Panjab, the North-Western Provinces, and Bengal, the area sown was on the whole equal to or in excess of the average, and the crop was sown under good conditions. These were modified for the worse by the absence of the winter rains, which held off until February. The harvest would have been more abundant if the rain had come earlier, but, nevertheless, a good harvest is expected. According to the Memorandum, in the Panjab and Sind there will be on the whole a fine wheat harvest on an area which comprises approximately 8,200,000 acres; and in the North-Western Provinces and Oudh, and in Bengal also, it seems likely that the harvest will be equal to an average. In view of the comparatively high price of wheat now ruling in Europe and the good harvest of the

Panjab and Sind, it is believed that there will be an active export of wheat from Karáchi during the coming season, and that the trade from Calcutta also will probably be larger than it has been in recent years.

The other of the two great regions mentioned above comprises Western and Central India, namely, Bombay, Berar, the Nizam's Territory, and the Central Provinces. In this region conditions have not been as favourable as in the other. There has been a contraction in area, and a yield on that area not equal to, and in some parts much below, an average. It is considered doubtful, therefore, whether from this region there will be such a surplus available for export as to bring the shipments of wheat from Bombay up to the level of former years.

The following paragraphs summarise the provincial reports :—

In the Panjab the area sown with wheat is now estimated at 7,654,400 acres, which is 8 per cent. larger than the average and 16 per cent. in excess of last year. The yield is, on the whole, estimated at about 9 per cent. in excess of the average.

In the North-Western Provinces, as in the Panjab, sowings were made under favourable conditions, but the crop suffered from the prolonged drought from November to January. It is expected that the yield will come up to or exceed the average, if the present fine weather continues.

In Bengal the area under wheat is estimated at about 1,574,000 acres, being 15 per cent. larger than last year, abundant rains having fallen at sowing time. The subsequent drought affected the crop to some extent in the principal wheat-growing districts, but the yield for the province is estimated to be fifteen-sixteenths of the average.

In the Central Provinces the area sown is 1,882,000 acres, this area being slightly smaller even than last year and not quite half the average; but the crop is reported to be in good condition, and the yield for the province is estimated at thirteen-sixteenths of the average.

In Bombay and Sind the area sown is estimated at 2,280,000 acres, being 23 per cent. more than the area sown

in 1896-97 (which, however, was abnormally contracted) but 22 per cent. less than the average. The yield is expected to be middling in parts of the Deccan and the Karnátak; but elsewhere it may be taken as being fair to good.

In Berar the area under wheat is estimated to be 370,000 acres, being somewhat smaller than last year and 57 per cent. smaller than the average. The yield will, it is expected, be about 56 per cent. of the average.

In the Nizam's territory the area sown is stated to be 1,091,000 acres, being 28 per cent. larger than that of 1896-97. The yield was estimated at about two-thirds of the average, but it is apprehended that the estimate must be modified in consequence of the absence of the winter rains.

THE ARGENTINE WHEAT CROP OF 1897-98.

In a note relating to the Argentine harvest of 1897-98, published in the last number of this Journal, it was stated that Her Majesty's Vice-Consul at Rosario had estimated that the export of wheat from Argentina, after allowing for the home consumption and for seed, would amount to about 1,000,000 tons, of which about 600,000 tons would be shipped from Rosario. In a subsequent report on the trade of Argentina in 1897, Mr. Laing, Her Majesty's Acting Consul at Buenos Ayres, observed that it was calculated that the yield of wheat at the last harvest would leave a surplus for export of between 1,000,000 and 1,200,000 tons. Both these estimates have since been modified by a later despatch received by the Foreign Office from Mr. Laing, who states that although the figures which are quoted above were in no way excessive or exaggerated at the time they were given, unprecedented heavy rains have, in the interval, caused considerable damage to the crop, while it was in stack, as well as after threshing had taken place, and that the damage due to frost was found to be much greater than anticipated. Owing to these circumstances it is now estimated that the total quantity of Argentine wheat avail-

able for export from the last harvest amounts to between 750,000 to 850,000 tons, of which some 500,000 tons will probably be shipped from the port of Rosario.

Mr. Laing remarks that it is certain that the wheat acreage in Argentina will be considerably increased this year, as not only are present prices very remunerative, but the Government measures for the destruction of the locusts and for providing the poorer colonists with seed wheat, to be repaid after the crop is harvested and sold, have been most successful.

The exports of wheat from Argentina in 1897 amounted to 94,289 tons, of which 10,802 tons were shipped to the United Kingdom, 14,308 tons to Belgium, and 46,249 tons to Brazil.

CROPS IN AUSTRIA.

According to the Austrian official reports on the condition of the crops at the middle of May, quoted in the *Wiener Landwirtschaftliche Zeitung* of the 25th May last, there appear to have been copious rains throughout the country since the date of the previous report. Rye stood very well, with few exceptions, and the same might be said of the wheat, which had been less injured by the wet, and in the north was better than the rye. Spring corn, except in Bohemia and parts of Eastern Galicia, was promising, and the plant was generally coming up well, particularly barley; oats were satisfactory. The warm rains experienced in most parts had been very favourable to clover and meadows; the former was in many cases unusually fine, and cutting had already begun. Potatoes and hops were both backward, owing to the wet and cold. The prospects of flax and fruit were not so good, but the vines looked very well.

CROPS IN HUNGARY.

The official reports on the prospects of the harvest in Hungary, received through the Foreign Office, indicate that

the agricultural situation on May 10th was as follows:—Favourable rain had fallen early in the month generally throughout the country and the condition of the growing crops was satisfactory. In some districts where insufficient rain had fallen the corn stalks had a tendency to over-growth. Late autumn-sown crops showed an improvement on the whole, but would only give at best an average yield. In many districts a good deal of damage had been done by worms, especially to wheat and rye; the Hessian fly and other insects have also done some harm to winter and spring-sown crops, but the amount of loss was unimportant.

Agricultural operations throughout the kingdom had been favoured by good weather. The sowing of turnips, maize, and potatoes was completed and the first crop of new potatoes gathered in. Winter rye, barley, and particularly rape, were reported to be strong. Winter wheat in most of the Alföld was still very low; barley and oats were fairly high and looked well.

Since 1895 there has been considerable change in the amount of different kinds of cereals sown in each year, and it is probable that further change will be found this year on account of a deficiency of winter seed. It may, however, be reckoned that there were under cultivation 7,000,000 acres of wheat, or about 747,000 acres less than last year. The area under rye could scarcely be estimated at more than 2,300,000 acres. Spring barley and oats covered an increased area, and the same was the case with maize, millet, etc.

The general improvement in harvest prospects made it possible to estimate a yield of 16.5 to 17.5 bushels of wheat, per acre, or a total of 120 to 125 million bushels as against 90 millions last year. There existed no ground for apprehension that the corn crop would fall below the average—indeed, in several provinces the outlook was far more favourable than it has been for some years past.

Rye was expected to yield about 35 million bushels, only a little better than that of last year. In some favoured parts the promise was greater, and the rye was already in bloom.

Autumn sown barley had suffered a good deal, but this loss would be compensated by the increase in the spring crop. A total yield of about 60 million bushels as compared with 40 million last year was looked for.

The area under oats was ten per cent. above that in 1895. Generally the fields looked very well, though weeds and worms had done much damage. The expected yield was about 68 million bushels, or 23 millions more than in the past year.

In the greater part of the lowlands maize was ready for cutting, and generally speaking the crop was good.

Vegetables and garden stuffs were fairly good throughout the country, and the same was the case with hops and tobacco plants. Beetroot had suffered a good deal, but may produce a fair average crop, and the same might be said of the grass.

Peronospera was still rife in the vineyards and caused much anxiety. Fruit trees had already suffered considerably from hail and rain, and did not promise an abundant harvest.

CROPS IN DENMARK.

The reports published by the *Ugeskrift for Landmænd* state that the crops in Denmark at the end of May were badly in want of sunshine, the weather during the month having been for the most part stormy, with north-east winds and occasional night frosts. Winter-wheat was indifferent and discoloured in some districts; but rye, which was everywhere springing into ear, was generally in fair condition, although the crop was thin in parts, and there were complaints of damage from night frosts. Spring-sown crops were doing well, but they were not so forward as usual. Sugar-beets and fodder-roots were backward; but clover and grasses were generally in good condition, and with warmer weather a good crop of hay was expected.

CROPS IN FRANCE.

The French Ministry of Agriculture have recently issued an estimate of the condition of the crops in France on the

10th May, 1898. According to this estimate it appears that the condition of winter wheat was very good in thirty-three departments, good in fifty-one, and fairly good in the remaining three departments. The area under this cereal was greater than last year in no less than seventy-one departments, whilst in only four was it actually inferior to that of 1896-97. Spring wheat is not grown in thirty-seven departments, but in forty-six departments the state of the crop was reported to be good, or very good. The condition of the rye, oats, and barley was also favourable throughout the country. The potato crop was not sufficiently forward in thirty-three departments to enable any report to be made, but in ten departments the crop was declared to be very good, good in twenty-eight, and fairly good in five departments. The condition of the grass and meadow land appears to have been satisfactory.

CROPS IN GERMANY.

The official reports of the condition of crops in Germany in the middle of May show that the recent cold and rainy weather had kept vegetation back, and complaints from this cause had been received from many districts, especially from Brunswick and Hanover. Nevertheless, throughout the whole Empire, the prospects showed an improvement upon the April returns, and the condition of all the cereals was in May better than for several years past, especially as regards wheat. All crops which were above ground were described as "good," or nearly so. Generally speaking, their condition was considerably better in the south and west than in the north-east, the best reports of all coming from the Palatinate, which indicated exceptionally good prospects for all crops.

The area ploughed in, owing to weather, snails, etc., was unimportant, amounting to but 0·5 per cent. in the case of wheat. Cultivation of potatoes had been much hindered by the weather; the plant had appeared in very few districts, while in many cases rot was feared. Clover and meadows promised well, though in some low-lying localities the meadows were under water.

CROPS IN ITALY.

In the *Rivista Meteorico-Agraria* of 11th May last, published by the Italian Ministry of Agriculture, it is stated that the wheat crop in Italy was in a satisfactory condition at the end of April, and that spring-sown crops were doing well. In northern and central Italy heavy rains had retarded farming operations, but no serious damage had been done.

THE BELGIAN HARVEST OF 1897.

From data furnished by the Provincial Agricultural Commissions of Belgium it appears that the harvest of 1897 was less than that of 1896, though the quality of the crops was good. Oats, which have been more extensively cultivated throughout the various provinces than heretofore, is the only cereal showing an increase in yield. It is estimated that about 1,360,700 acres were devoted to the cultivation of the two principal cereals, viz., wheat and rye, the yield of which is approximately stated at 33,000,000 bushels, a deficiency of about 8,175,000 bushels on the preceding harvest. The yield of wheat is put at 27 bushels per acre as compared with 30 bushels in 1896, and of rye at 26 bushels as against about $30\frac{3}{4}$ bushels; the deficit of these cereals which it will be necessary to import is estimated at about 16,000,000 bushels. The yield of potatoes averaged about $5\frac{3}{4}$ tons per acre, or about the same as in 1896, but much less than the two preceding years. The quality of the potatoes throughout the Kingdom is said to have been good.

THE ROUMANIAN HARVEST OF 1897.

The Roumanian Ministry of Agriculture has recently issued statistics of the results of the past year's harvest, from which it appears that the loss of cultivated area owing to the floods of the spring and summer of 1897 amounted to 8.51 per cent. The following table shows the acreage and production

of the principal crops in 1897, as compared with the average for the previous five years :—

	Area.		Production.	
	1897.	Average 1892-96.	1897.	Average 1892-96.
	Acres.	Acres.	Bushels.	Bushels.
Wheat - -	3,596,400	3,524,900	35,321,800	59,690,400
Rye - -	544,300	443,100	6,584,300	7,670,300
Barley - -	1,570,700	1,419,600	20,569,200	24,692,000
Oats - -	659,200	638,500	9,547,700	11,947,100
Maize - -	4,173,000	4,551,600	77,308,800	64,297,700
Colza - -	109,500	125,100	1,308,400	1,362,300
Millet - -	160,800	222,800	3,026,700	1,934,100

The yield of wheat in 1897 was only 9·8 bushels per acre, as compared with an average of 17 bushels during the previous five years ; the yields of rye, barley, and oats were also considerably below the average ; in the case of maize, however, the reverse was the case, the yield per acre being larger than in any year since 1892, and 4·4 bushels above the five-year average. The area under millet was low, being 160,780 acres, against 222,770 acres in the period 1892-96 ; but the production amounted to 3,026,700 bushels, or a yield per acre of 18·9 bushels, as compared with an average of 8·7 bushels. Flax was grown on 69,200 acres, and the yield of seed was 654,900 bushels. The production of potatoes amounted to 1,085,700 cwts., and of tobacco to 74,400 cwts. The area of meadow and pasture land was 1,433,600 acres.

THE RUSSIAN HARVEST OF 1897.

In the March number of the Journal data were published of the preliminary estimates of the production of cereals in Russia in 1897. Copies of the detailed official returns of the Central Statistical Committee have since been received, and from these it is possible to give particulars of the results of the harvest in the several principal divisions of the Empire.

The acreage under the principal crops in 1897 is estimated to have been as follows :—

Governments.	Wheat.	Rye.	Barley.	Oats.	Potatoes.
	Acres.	Acres.	Acres.	Acres.	Acres.
50 European Governments - - -	35,610,278	62,653,557	17,220,711	36,210,478	6,328,257
10 Polish Governments - - -	1,210,559	4,788,455	1,045,283	2,506,345	1,916,625
3 Caucasian Governments - - -	5,589,894	570,642	1,485,078	715,451	166,169
4 Siberian Governments - - -	3,121,392	2,358,353	350,500	2,394,506	151,189
4 Asiatic Governments - - -	1,206,270	90,137	152,588	395,912	17,480
Total - - -	46,738,393	70,461,144	20,260,760	42,222,692	8,579,720

The estimated produce of the foregoing crops is given below :—

Governments.	Wheat.	Rye.	Barley.	Oats.	Potatoes.
	Qrs.	Qrs.	Qrs.	Qrs.	Tons,
50 European Governments - - -	29,726,430	65,997,710	24,327,360	55,960,510	15,694,580
10 Polish Governments - - -	2,219,050	6,306,830	1,910,020	4,251,800	5,814,750
3 Caucasian Governments - - -	3,723,760	437,140	1,330,310	684,520	233,090
4 Siberian Governments - - -	5,337,670	3,255,820	732,010	6,088,650	419,410
4 Asiatic Governments - - -	1,381,580	96,820	248,980	875,130	35,380
Total - - -	42,388,490	76,094,320	28,548,680	67,860,610	22,197,210

The estimated area under buckwheat in the seventy-one governments was 6,309,000 acres, and the production 3,887,000 quarters; maize was grown on 2,597,000 acres, which produced 6,043,000 quarters; millet on 7,425,000 acres from which the estimated crop was 6,739,000 quarters; and spelt on 1,184,000 acres, which yielded a total crop of 1,112,000 quarters.

THE SWEDISH HARVEST OF 1897.

The Swedish Statistical Bureau has issued the following estimated results of the crops of 1897. These figures are arrived at by calculations based on the quantity of seed sown and on reports received from the prefects of provinces. In the case of wheat and rye the yield was very good, and the weight of grain per bushel was somewhat higher than the average for the last ten years. The quality of the crops is

stated to have been excellent, owing to the favourable character of the season.

	1897.	Average 1887-96.
	Bushels.	Bushels.
Wheat - - - - -	4,430,800	4,054,000
Rye - - - - -	22,870,100	21,271,500
Barley - - - - -	13,861,400	13,945,200
Oats - - - - -	56,666,200	60,448,600
Mixed Corn - - - - -	9,229,550	8,260,200
Peas - - - - -	1,444,800	1,477,600
Beans - - - - -	171,300	205,100
Vetches - - - - -	716,600	696,800
Potatoes - - - - -	54,374,400	53,247,400

HARVEST OF 1897 IN ONTARIO.

The official report on the crops and live stock of Ontario in 1897 indicates that a large supply of very good autumn wheat was grown throughout the province generally, but that the quality of the spring wheat grain was not up to the average. The crop of barley was normal, if rather short of straw, and oats gave a fair yield.

The following table shows the actual yield of the crops obtained in the province during the year 1897. The comparative figures for the previous year and for the period 1882-1897 are also given :—

Crop.	Acreage.			Yield.		
	1897.	1896.	1882-97.	1897.	1896.	1882-97.
	Acres.	Acres.	Acres.	Bushels.	Bushels.	Bushels.
Autumn Wheat -	950,222	876,955	891,144	23,988,051	15,078,441	18,022,748
Spring Wheat -	323,305	255,361	479,758	4,868,101	3,519,322	7,283,391
Barley -	451,515	462,792	642,350	12,021,779	12,669,744	16,458,522
Oats -	2,432,491	2,425,107	1,875,240	86,318,128	82,979,992	64,476,051
Rye -	187,785	148,680	107,805	3,382,005	2,230,873	1,741,187
Buckwheat -	151,669	145,606	95,565	3,464,186	2,603,669	1,902,163
Potatoes -	169,333	178,965	158,937	16,100,797	21,305,477	18,598,009

The total area under all crops in the past year was 8,701,705 acres, as compared with 8,511,444 acres in 1896. The area devoted to pasture was 2,618,245 acres. The number of apple trees of bearing age was placed at 6,102,399,

while 3,435,018 younger apple trees were planted in orchards. The estimated yield of apples in 1897 was 13,343,720 bushels; the average yield per tree being 2.19 bushels, as against 9.45 in 1896.

The number of live stock in the province on 1st July, 1897, was returned as follows :—Horses, 613,670; cattle, 2,182,326, including 940,236 milch cows; sheep, 1,690,350; and hogs, 1,284,963.

The wool clip was 5,139,984 pounds, as compared with 5,581,387 pounds in 1896.

PARLIAMENTARY PUBLICATIONS.

Board of Agriculture.—Annual Reports of Proceedings under the Diseases of Animals Acts, the Markets and Fairs (Weighing of Cattle) Acts, &c., &c., for the year 1897. [C. 8796.] Price 2s. 0½d.

The report of the Chief Veterinary Officer of the Department, Mr. A. C. Cope, which occupies the first part of this volume, deals mainly with the history, etiology, pathology, and morbid anatomy of pleuro-pneumonia, and the various stages of this disease are illustrated by a series of eight coloured drawings, taken from fresh specimens, representing the appearances presented by the lesions of pleuro-pneumonia in its early and progressive stages.

The second part of the volume consists of the report of the Assistant Secretary, Animals Division, Major J. T. Tennant, on the work of the executive staff. The most important duties—so far as the general public are concerned—in which the Animals Division has been engaged during the past year have been in connection with the attempt which is being made to eradicate rabies in Great Britain. A full account is given of the measures taken in this direction under the Rabies Order of the 23rd March, 1897, whereby the muzzling of dogs now practically rests with the Board of Agriculture. Diagram maps are furnished showing the number of cases of rabies reported in the counties of England and Wales in 1896 and 1897, and the areas under muzzling orders in the latter year.

The other subjects dealt with in this report relate to the executive work undertaken in connection with swine fever, pleuro-pneumonia, and sheep-scab; the enforcement of the

regulations affecting the conveyance of animals by sea and land; and the administration of the Markets and Fairs (Weighing of Cattle) Acts. The volume concludes with a series of tables showing the outbreaks of contagious diseases of animals in Great Britain, and the live-stock trade of the United Kingdom and foreign countries.

Board of Agriculture.—Annual Report of Proceedings under the Tithe and other Acts administered in the Land Division for the year 1897. [C. 8,795. Price 2d.]

The total number of applications to the Board under the provisions of the Tithe Acts was 852 in 1897, as compared with 721 in the previous year. Of these 544 were applications for redemption of tithe rent-charge, 208 for altered apportionments, and 100 for other descriptions of business. The first cases in which landowners have availed themselves of the powers under the Extraordinary Tithe Act of 1897 are embodied in this report. The total number of enfranchisements completed by the Board under the Copyhold Act was 323.

During the year the award under the enclosure Acts in the matter of the enclosure of the Common Fields at Upton St. Leonard's, near Gloucester, authorised by Parliament in 1895, was confirmed by the Board. By this award fifteen acres of arable land in convenient situations were allotted for field gardens for the poor inhabitants, and six acres of grass land in a field near the village were set out as a public recreation ground. These allotments are now vested in and under the management of the Parish Council. As a further result of the enclosure a second recreation ground of six acres, in another part of the parish, has been conveyed to the Parish Council as a free gift on the part of one of the largest proprietors.

Reports were called for in 1897, pursuant to Section 28 of the Commons Act, 1876, with respect to field-garden and recreation allotments set out under the Inclosure Acts. In regard to field gardens, 356 reports were received, from which

it appeared that in 273 cases the land is let in allotments. The rents taken for the land vary from 10s. to 50s. per acre. In regard to recreation grounds 302 reports were received. In 212 cases the land is more or less used for recreation purposes, and in about 160 cases the herbage is let.

Two schemes were approved and certified by the Board under the Metropolitan Commons Act, relating respectively to East Sheen Common and to Barnes Common, both in the county of Surrey, and schemes are also under consideration in regard to Ham Common and Ham Fields in Surrey, and Harrow Weald Common in Middlesex.

Applications under the Universities and College Estates Acts to the number of 155, involving transactions to the value of £254,985, were dealt with, as well as fifty-six applications under the Glebe Lands Act, 1888.

Certificates under section 5 (1) of the Light Railways Act, 1896, have been granted in five cases.

For the convenience of the public the Ordnance Survey maps of Great Britain and Ireland on the scale of one inch to the mile, and those of Great Britain on the scale of six inches to the mile, are now kept at the offices of the Board, at 3, St. James's Square, S.W., and are available for inspection without charge.

Board of Agriculture.—Agricultural Returns for Great Britain, 1897. (C. 8,897.) Price 1s. 6d.

This publication now brings together for permanent reference in a single volume the information already published in seven separate instalments, concerning the areas and produce of the crops, and the numbers of the live stock of Great Britain 1897, certain supplementary details being now added. Summaries for the United Kingdom, including the Irish figures and those for the Isle of Man and Channel Islands, are also given, as well as the customary data respecting the prices, imports, and exports of agricultural produce in 1897 and previous years; together with a series of tables summarising the agricultural statistics of British colonies and of various foreign countries. The last section

of the returns has on the present occasion been augmented by information not previously available for several countries, while details based upon more recent inquiries have brought some of the foreign statistics down to a later date. Diagram maps, one showing the grouping of the counties of Great Britain in agricultural divisions, and another indicating the relative density of the flocks of the country per 1,000 acres of total area, are given in the volume.

It is pointed out that the schedules issued to occupiers of land in Great Britain on which the annual returns are based have been simplified, with the result of securing greater convenience and greater accuracy in the information furnished in several directions in which there had been previously some misunderstanding on the part of the occupiers. The total cultivated area of Great Britain, that is the surface returned by the occupiers as consisting of arable land or of permanent pasture, excluding the rough grazings, is given as 32,520,000 acres in 1897, an apparent reduction of 42,000 acres below that of 1896. Part of this diminution is, however, due, in this as in former years, to the continuous withdrawal of land from cultivation for building and other purposes, and part to the more accurate classification of grass lands as permanent pasture or rough grazings in certain counties.

The chief feature to which Major Craigie draws attention in his report on the tables is the addition shown in 1897 to the area of arable land, and the apparent diminution of that returned as permanent pasture. Slight checks to the downward movement of the area under the plough had been recorded in one or two years of the last quarter of the century, but not until 1897 has so material a change appeared in the direction opposite to that which has so long been current, there being 171,000 acres more returned as arable, and 214,000 acres less shown as permanent grass. These changes are only in part due to the ploughing up of pasture land, as there is a large real or apparent addition to the surface returned as under clover and temporary grasses. In spite of an extension of 195,000 acres under wheat alone in 1897 the corn crops as a whole show a net increase of about

40,000 acres only, the addition to the wheat land being in great part made at the expense of other grain and green crops, while 48,000 acres of fallow were called back into tillage. The increase in the arable area and the specific recovery in wheat are both relatively greatest in the western section of the country, where the decline in wheat cultivation was in former years most apparent.

The acreage and numbers of live stock in 1897 in Great Britain have already been quoted, as the statistics were issued in earlier numbers of this Journal, but the data now published as to roots and minor crops in Great Britain indicate a reduction of 50,000 acres in the total area under turnips, which stands at 1,833,000 acres in 1897, the deficit being almost made up by an increased cultivation of mangolds (354,588 acres in 1897) and of vetches, and by a noteworthy augmentation of 14 per cent. in the area under lucerne. The acreage under flax has again fallen back from the temporary increase noted two or three years back, and is now only 1,419 acres, or 21 per cent. less than in 1896. The report mentions that the new schedule already alluded to has brought to light some errors in the area formerly shown as under small fruit, which shows an apparent reduction, due mainly to local corrections, of 6,500 acres. Orchards continue to exhibit an increase of not far short of 3,000 acres.

The yield of the grain crops was given in the Journal for December last, and that of the crops of hay and of potatoes in the Journal for March, and it may be added that the present returns show beans and peas to have had over-average yields per acre, and that the turnip crop of 1897 was estimated to have exceeded the average production by nearly a ton per acre, mangolds also being about 10 per cent. over average.

The returns furnish full details of the course of grain prices in 1897, and, as in the previous year, a series of comparisons are given showing the available quotations of the prices of meat at London and in one or two other centres. Both in the case of beef and of mutton the figures supplied indicate that prices in 1897 were on the average above the level of 1896.

The usual import tables will be found to give detailed information as to the quantities, values, and sources of the sea-borne food of this country; and the foreign section of the returns enables contrasts to be drawn between the production of other countries and that of our own. A new table has been added to this part of the returns, illustrating the wide difference in the total areas, and in the aggregate populations, of the several countries for which statistical information is given—differences which in many respects, it is pointed out, impede the institution of exact comparisons, and explain the difficulty often encountered in obtaining foreign agricultural statistics in as complete a form, and brought up to dates as recent as are those of the United Kingdom.

Agricultural Statistics, Ireland.—Tables showing the extent in statute acres and the produce of the crops for the year 1897.
[C. 8,623.]—Price 3d.

The area and produce of the principal crops in Ireland in 1897 are given as follows:—

Crop.	Area.	Total Produce.	Produce per Acre.
	Acres.	Cwts.	Cwts.
Wheat - - - - -	47,235	726,021	15'4
Oats - - - - -	1,175,118	16,264,733	13'8
Barley - - - - -	170,504	2,587,137	15'2
Bere - - - - -	148	1,876	12'7
Rye - - - - -	13,058	141,593	10'8
		Tons.	Tons.
Potatoes - - - - -	677,216	1,498,416	2'2
Turnips - - - - -	308,966	4,133,585	13'4
Mangel Wurzel and Beetroot - - -	54,649	751,056	13'7
		Stones.	Stones.
Flax - - - - -	45,537	7,272	25'6
Hay: Clover, Sainfoin, and Rotation			Tons.
Grasses - - - - -	637,128	1,434,686	2'3
Permanent Pasture - - - - -	1,539,014	3,653,231	2'4

The acreage of wheat was 24 per cent. above that of 1896, but, with the exception of the turnips and mangels, all other crops exhibited a decreased area—flax by 37 per cent.

Except cere, flax, and hay, the yield of all crops was also below last year, while only hay was above the average of the ten years, 1887-96, and that by a little over ten per cent. The most serious decline was shown by potatoes, the average yield of which is 3·7 tons per acre; 72·6 per cent. of the acreage under potatoes was planted with the Champion variety.

Reports from Her Majesty's Representatives on Legislative Measures respecting Gambling in "Option" and "Future" Contracts. [C. 8850.] Price 3d.

The Foreign Office last year requested Her Majesty's Representatives in various foreign countries to obtain translations of any measures, either proposed or in force, for prohibiting or restricting gambling in "option" and "future" contracts representing fictitious agricultural produce or metals. The replies received have now been published as a parliamentary paper.

In the Argentine Republic the articles of the Commercial Code tend to show that losses on operations of this nature are not recoverable at law.

In Austria payment in all such transactions at an Exchange, and in articles dealt in exclusively at the Exchange in question, can be legally exacted. In Hungary there is no restrictive legislation on the subject.

In Belgium gambling debts are not recoverable at law, and it has been held in the Court of Appeal that this includes future contracts where there is no intention to actually deliver goods; but the fact of the transaction being a gambling one has to be proved in each separate case. A Bill definitely prohibiting all fictitious dealings of this nature passed the Senate in December, 1896, but had not (in April, 1897) come before the Lower House.

In France gambling in options and futures is practically sanctioned by the law of 28th March, 1885. A Bill to prohibit such dealings in provisions and agricultural produce was introduced by M. Rose in June, 1896, in the Chamber of Deputies, and a committee reported favourably on it in

February, 1897. It was referred to a Commission in October, but no further progress had been made by February of this year.

In Germany the law of 22nd June, 1896, prohibits gambling in futures in agricultural produce and metals.

In Greece future contracts, of which the only object is the payment of a difference, have been held to be gambling, and consequently null and void.

In Russia such transactions are not recognised, either by the practice or regulations of the Exchanges, and the Government has consequently not had occasion to exercise measures of restriction with regard to such dealings.

In Sweden and Norway there are no laws restricting such transactions.

In Switzerland gambling debts, and time bargains which partake of the nature of gambling and betting, are not recoverable at law; and it has been held that this applies to transactions in which the contract is to be fulfilled by the payment of a difference.

In the United States a Bill imposing taxes on dealers in options and futures was introduced by Mr. Bankhead in the House of Representatives in December, 1895, read twice, referred to the Committee on Agriculture, and ordered to be printed. Mr. Peffer in the same month introduced a Bill in the Senate to prevent such dealings; this was read twice, and referred to the Committee on Agriculture and Forestry.

Royal Commission on Tuberculosis.—Report of the Royal Commission appointed to inquire into the administrative procedures for controlling danger to man through the use as food of the meat and milk of tuberculous animals.

[C. 8824. Price 3d.]

This Report gives some account of the result of inquiries in respect of the prevalence of tuberculosis among British and Irish agricultural stock made by the Commissioners, and of the legislation at present in force in Great Britain affecting the use as food of the meat and milk of tuberculous

animals. The Commissioners make various recommendations, of which the following are the principal :—

1. That, with respect to the substitution of public for private slaughter-houses, powers be granted to the authorities of all towns and municipal boroughs in England and Wales and in Ireland similar to those conferred on Scottish corporations and municipalities by the Burgh Police (Scotland) Act, 1892. This would have the effect of making the use of a public slaughter-house (where provided) obligatory. 2. That in Great Britain the inspection of meat in rural districts be administered by the County Councils, and that it shall not be lawful to offer for sale the meat of any animal which has not been killed in a duly licensed slaughter-house. 3. That no person be permitted to act as a meat inspector until he has passed a qualifying examination before an authority prescribed by the Local Government Board (or Board of Agriculture). 4. That the Local Government Board be empowered to issue instructions from time to time for the guidance of meat inspectors, prescribing the degree of tubercular disease which should cause a carcase, or part thereof, to be seized. The Commissioners state the principles which should be observed in the inspection of tuberculous carcasses, pending the issue of such instructions.

With regard to milk, the Commissioners recommend :—

1. That notification of every disease in the udder of cows should be made compulsory, under penalty, on the owners of all cows. 2. That local authorities should be given powers somewhat similar to those of sections 24-27 of the Glasgow Police (Amendment) Act, with power to slaughter tuberculous cows. 3. That powers be given to local authorities to take samples and make analyses of the milk produced or sold in their districts. 4. That the Local Government Board be empowered to require local authorities to adopt regulations as to dairies, cowsheds, &c., where that shall be found not to have been done already.

The Commissioners also recommend that funds be placed at the disposal of the Board of Agriculture in Great Britain for the preparation of commercial tuberculin, and that stock-owners be encouraged to test their animals by the offer of a

gratuitous supply of tuberculin and the gratuitous services of a veterinary surgeon on certain conditions.

In a supplementary memorandum three of the Commissioners recommend that compensation be paid to the owner of a carcase confiscated and destroyed, wholly or in part, by order of a magistrate on account of tuberculosis.

Land (Compulsory Purchase and Hiring). Return of the number of instances in which, between the 27th day of December, 1894, and the 24th day of June, 1897, local authorities acquired land for allotments and small holdings by (1) compulsory purchase, (2) purchase by agreement, (3) compulsory hiring, and (4) hiring by agreement. (H.C. 17. Price 5½d.)

The total acreage of land acquired by local authorities for allotments between the 27th December, 1894, and the 24th June, 1897, was 14,818 acres, of which 33 acres were acquired by three county councils, 42 acres by three councils of county boroughs, 1,591 acres by 120 urban district councils, 160 acres by nine rural district councils, 12,967 acres by 1,009 parish councils, 19 acres by four parish meetings, and 4 acres by one metropolitan vestry. In 24 cases the land was acquired by purchase by agreement, in 6 cases by compulsory hiring, and in 1,156 cases by hiring by agreement.

The total number of tenants to whom the allotments had been let was 32,663. Sixty-one county councils, 61 councils of county boroughs, 963 urban district councils, 692 rural district councils, 6,361 parish councils, and 5,733 parish meetings did not acquire land for allotments during the period in question.

Three county councils acquired land in six parishes for small holdings between the 27th December, 1894 and the 24th June, 1897, in one parish by purchase by agreement, and in five parishes by hiring by agreement. The total acreage of the land so acquired was 120 acres, and it was let to forty-five tenants.

One hundred and eighty-three parish councils acquired land for purposes other than allotments prior to the 24th June, 1897.

in 44 cases by purchase, and in 125 cases by hiring. In most of the remaining cases the land was acquired by gift. The total acreage of the land so acquired was 852a. or. 19p. The purposes for which the lands were acquired included recreation grounds in 113 cases, burial grounds in 31 cases, and for various other purposes.

Technical Education. Return showing the extent to which, and the manner in which, Local Authorities in the United Kingdom have applied, or are applying, funds to the purpose of Technical Education (including Science, Art, Technical, and Manual Instruction) during the years 1895-6 and 1896-7. [H.C. 119.] Price 1s. 6d.

This return shows the amount spent on technical education by local authorities in the United Kingdom—with the exception of nine which have made no return—during the year 1895-6, together with the estimated expenditure during the year 1896-7. Particulars are also given of the amounts raised by loan on the security of the local rate under the Technical Instruction Act, 1889—mainly for the erection of Science, Art, and Technical Schools. Of the nine smaller authorities which have failed to furnish any information, only one or two are believed to have applied any money to educational purposes during the two years in question. With regard to the expenditure on technical education out of rates levied under the Public Libraries' Acts, the return only includes that portion of the rate which has been applied to the building or maintenance of science and art schools, art galleries, or museums. Only those boroughs and urban districts (England and Wales) the councils of which have made grants out of the rates under the Technical Instruction Acts, or devoted part of the proceeds of the Public Libraries' rate to the building or maintenance of science and art schools, art galleries, or museums have been included in the return. The grants made to those authorities by county councils, out of the residue received under the Local Taxation (Customs and Excise) Act, are accounted for in the expendi-

ture by the county councils, and the return does not show the manner in which such grants have been applied. In many boroughs and urban districts, not individually named in this return, which do not raise rates under the Technical Instruction Acts, science, art, and technical instruction is being carried on with the grants made by county councils out of the residue.

The total amount expended on technical education during the year 1895-6 in the United Kingdom of Great Britain and Ireland was £787,467 13s. 2d., and the estimated total expenditure on technical education during the year 1896-7 was £847,620 17s. 8d. These amounts are exclusive of the sums allocated to intermediate and technical education under the Welsh Intermediate Education Act, 1889. The amounts raised by loan on the security of the local rate under the Technical Instruction Acts were £179,501 11s. 3d. in 1895-6, £131,163 19s. 6d. in 1896-7.

Agricultural Rates Act, 1896 (Rateable Values). Return showing, as regards each union and parish in England and Wales, the rateable value of such union and parish according to the statements furnished to the Local Government Board by assessment committees (or other assessing authorities, where there are no assessment committees) under the Agricultural Rates Act, 1896, etc. [H. C. 368.] Price 1s. 4½d.

This return shows the rateable value (exclusive of the annual value of non-rateable hereditaments in the occupation of the Crown) of each union and parish in England and Wales, according to the statements furnished to the Local Government Board by assessment committees (or other assessing authorities where there were no assessment committees) under the Agricultural Rates Act, 1896, and distinguishes the rateable value of agricultural land, as defined by that Act, from the rateable value of buildings and other hereditaments not being agricultural land. The statements from which the return is compiled show the rateable value

of the unions and parishes on the 20th July, 1896. Statements were not received under the Act from the unions and parishes under separate boards of guardians which contained no agricultural land as defined by the Act, and the rateable values of those unions and parishes have been taken from returns which show their rateable values at the beginning of the financial year 1896-97.

It appears from the return that the total rateable value of property liable to be rated to the poor rate in England and Wales was as follows:—Agricultural land, as defined by the Agricultural Rates Act, £24,565,058 3s. 10d.; buildings and other hereditaments not being agricultural land, £140,847,208 7s. 6d.; total, £165,412,266 11s. 4d.

Light Railways.—Report of the Proceedings of the Board of Trade, under the Light Railways Act, 1896, during the period ending 31st December, 1897, and of the Proceedings of the Light Railway Commissioners during the period ending 22nd November, 1897. [H.C. 55. Price 2½d.]

Immediately on the passing of the Light Railways Act the Board of Trade issued a memorandum addressed to the local authorities drawing attention to its provisions, and in September, 1896, rules governing the procedure with respect to applications to the Light Railway Commissioners were made by the Board. The orders made by the Commissioners, and submitted to the Board of Trade for confirmation, were nine in number, of which four had been confirmed at the end of last year.

The Commissioners state in their report that in December, 1896, 28 applications were made, representing an aggregate mileage of about 308 miles, and orders were granted in 17 cases. In May, 1897, the number of applications for orders was again 28, covering about 276 miles, and it was decided to grant orders in 18 cases. The nature of the various schemes submitted is given in a table, and the Commissioners add that there seems, so far, to be a preference for the standard railway gauge, and that some of the leading rail-

way companies, especially in Scotland, have availed themselves of the Act in a way which, as they believe, will result in affording accommodation to districts which would hardly have obtained it otherwise. Under the rules framed by the Board of Trade, deposits in connection with applications for orders have to be made in the months of May and November, but in 1896 December was substituted for the latter month.

Brewers' Licences. H.C. 83. Price 2½d.

According to this return the number of persons licensed as brewers for sale in the United Kingdom in the year ended 30th September, 1897, was 8,153, and the number of licences issued was 8,285. The number of persons licensed as brewers, not for sale, was 14,923. and of these 11,619 were private brewers not liable to beer duty. The total amount of licence duty paid in the year was £12,353 1s., and the amount of beer duty charged was £11,748,463 6s. 7d. The quantities of materials used by brewers for sale included 56,378,418 bushels of malt, 194,944 bushels of unmalted corn, 747,063 cwts. 2 qrs. 12 lbs. of rice, flaked rice, flaked maize, and similar preparations, and 2,569,457 cwts. 2 qrs. 22 lbs. of sugar, including its equivalent of syrups, glucose, and saccharum.

Local Government (Scotland). Third Annual Report of the Local Government Board for Scotland, 1896-7.
(C.—8,575.) Price 1s. 5d.

This publication is the third annual report under the Local Government (Scotland) Act, 1894.

The Board have decided that in assessing agricultural land under the Agricultural Rates (Scotland) Act, 1896, the deductions under section 37 of the Poor Law Act should be made from the gross rental as appearing in the Valuation Roll, and that on three-eighths of the sum thus obtained the assessment should be levied.

The Annual Local Taxation Returns (Scotland) for the Year 1895-96. [H.C. 167.] Price 2s. 9d.

This is the Sixteenth Annual Volume of Returns under the Local Taxation Returns (Scotland) Act, 1881. The revenue in 1895-96 of the various authorities amounted to £9,166,447, and an additional sum of £1,897,144 was received from loans. Of the former sum £3,995,373, or 43·6 per cent. of the total revenue was derived from Assessment. The average rates per £ of assessment during the years 1895-96—ascertained by dividing the total amount of all assessments collected by the gross valuation of the country—and the average rates per head of estimated population were 3s. 2·3d. and 19s. 1·9d. respectively; and the average rates per £ of assessment for Urban, Rural, and Parochial Authorities were 2s. 5d., 1s. 0·4d., and 1s. 3·5d. respectively.

The total expenditure of the various local authorities not defrayed out of loans in 1895-96 was £9,314,587; and the expenditure met out of borrowed money amounted to £2,054,995. The main items of expenditure were £1,531,600 for education, £674,825 for roads and bridges, £18,384 for valuation of lands and heritages, £17,521 under the Diseases of Animals Act, £8,251 under the Weights and Measures Act, £24,399 for slaughter-houses, and £18,423 for markets.

Ireland.—Return in pursuance of the provisions of the 50th section of the Diseases of Animals Act, 1894, for the year ended the 31st December, 1897. [C.—8820]. Price 11½d.

This report states that no outbreak of any contagious cattle disease falling within the Orders in Council under the Diseases of Animals Act occurred in Ireland during the year 1897. The number of outbreaks of swine-fever confirmed after official examination during the past year was 421. In connection with the 421 confirmed outbreaks 4,132 swine were slaughtered, and in 930 cases the lesions of swine-fever were revealed on post-mortem examination; 616 swine were also slaughtered as suspected, but on post-mortem examination lesions of disease were not found. Forty-eight cases of

rabies were detected out of 138 cases submitted for investigation during the year. The results attained in Ireland under the Muzzling Order are reported to be encouraging, and there is good reason to believe that a strict enforcement of the regulations for a further period of no very prolonged duration will lead to the eradication of rabies, and render muzzling unnecessary in the future. The official returns indicate that 4,859 cases of sheep scab were reported in 1897, as against 4,889 in 1896, 4,899 in 1895, 6,597 in 1894, and 10,358 in 1893. Ireland appears to be practically free from glanders, only one outbreak having been confirmed during the year.

Land Tax.—A Return of Livings and Charitable Institutions Exonerated from Land Tax under Acts of Parliament between 1806 and 1822. [H.C. 108.] Price 1s.

This publication contains a list (1) of the livings and other ecclesiastical benefices, and (2) of the charitable institutions in England and Wales in respect of which certificates of exoneration from Land Tax were granted by the Commissioners appointed under the Great Seal, in execution of the Acts 46 Geo. III., cap. 133; 49 Geo. III., cap. 67; 50 Geo. III., cap. 58; 53 Geo. III., cap. 123; and 57 Geo. III., cap. 100.

PRICES OF LIVE STOCK

RETURNED UNDER THE WEIGHING OF CATTLE ACT.

Returns of prices collected under the Markets and Fairs (Weighing of Cattle) Act, 1891, for the first three months of 1898 are now available for comparison with previous data similarly obtained. By new Orders under the statute above quoted, which came into operation on the 1st of January last, Carlisle and Falkirk were added to the former number of 19 scheduled places in Great Britain. From the accounts rendered it appears that somewhat over 12,600 cattle, nearly 50,000 sheep, and nearly 3,900 swine were shown in the newly added markets, and including these figures the total number of animals returned to the Board of Agriculture as entering, weighed, and priced was as follows in the first quarter of 1898, and in the first quarters of the two preceding years:—

Animals.	1st Quarter, 1898.	1st Quarter, 1897.	1st Quarter, 1896.
CATTLE :	No.	No.	No.
Entering markets - - -	275,588	260,778	260,823
Weighed - - - - -	31,073	26,672	26,190
Prices returned - - -	27,953	24,274	23,709
Prices returned with quality distinguished.	23,668	18,591	17,916
SHEEP :			
Entering markets - - -	758,922	744,927	738,502
Weighed - - - - -	11,237	8,711	10,116
Prices returned with quality distinguished.	8,762	8,047	8,881
SWINE :			
Entering markets - - -	80,904	43,012	61,745
Weighed - - - - -	349	335	740
Prices returned with quality distinguished.	231	168	308

An increase is again exhibited in the number of cattle and of sheep for which weights and prices were given, the additional numbers being only partly due to the number of cattle returned from Carlisle and Falkirk, and wholly independent of the reports from these new markets in the case of sheep, of which none seem to have been weighed in these

NOTE.—The figures for 1898 include the returns from Carlisle and Falkirk.

instances. Of the sheep recorded as entering the 21 markets of Great Britain very few comparatively are reported to have been weighed, and in a still smaller proportion of cases are prices quoted in respect of those passing over the weigh-bridge. In swine there is a great increase in the numbers reported as marketed in the scheduled places, but the returns of weight and of prices are still too defective to form a basis for satisfactory averages of current values. Reports as regards live weight prices of swine came only from four places.

Cattle prices were supplied from seventeen of the twenty-one scheduled towns. There was an entire absence of quotation of prices from Ashford, Norwich, Salford, and Wakefield, and a very small number only were returned from Birmingham, Bristol, Lincoln, and York. There are now fifteen English towns named as returning centres under the Act of 1891, and it is in these markets rather than in Scotland—where the extent of weighing is always much greater—that the increase in cattle returned is shown in the first quarter of the present year. The 4,332 weighed and priced in England in the first three months of 1897, have been brought up to 7,394 in the same months of 1898, the largest factor in this increase being 2,549 transactions in the auction marts of Carlisle not formerly included. Nevertheless, only $3\frac{1}{2}$ per cent. of the cattle shown in England are recorded as having been weighed and priced, and nearly five-sixths of these cases were reported from the four markets of Carlisle, Liverpool, London, and Shrewsbury alone. At the latter place the transactions were, contrary to the practice elsewhere, mainly those in store stock. On the other hand, in Scotland, at the six scheduled places, 16,274 head of cattle were weighed and priced; Aberdeen, Edinburgh, and Dundee sending the most complete records. The total percentage of cattle reported to have been weighed and priced in Scotland was over 25 per cent. of the animals exhibited.

Adding to the towns which have been formerly selected as giving price quotations worthy of special record the two new returning markets, the following further table gives for twelve

of the scheduled places the average of prices per stone and per cwt. ascertained by dividing the total values reported by the aggregate live weight of the animals—these figures not including cattle distinguished as stores. It will be observed that the data even in these selected towns are in most instances very defective in the third or inferior class, and except in a few markets it is rare to find the weight of the lowest quality of stock tested on the weighbridge. It may be added that while the name of Shrewsbury is retained for the quarter for comparison with former records, the number of fat stock weighed at that centre is insufficient to make the quotation of much real value.

PLACES.	INFERIOR OR Third Quality.			GOOD OR Second Quality.			PRIME OR First Quality.		
	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.
Carlisle - - -	709	s. d.	s. d.	1,409	s. d.	s. d.	431	s. d.	s. d.
Leeds - - -	21	3 2	25 4	103	3 8 ³	29 10	311	4 0 ²	32 6
Liverpool - - -	128	3 6	28 0	68	3 8 ³	29 6	4	3 11 ³	31 10
London - - -	15	3 0	24 0	399	3 6	28 0	1,080	4 0	32 0
Newcastle - - -	21	3 2	25 4	24	4 1 ¹	32 10	648	4 8	37 4
Shrewsbury - - -	22	3 3 ²	26 4	23	3 8 ³	29 8	598	4 2 ¹	33 6
Aberdeen - - -	1,355	3 1	24 8	2,457	4 0 ²	32 2	1,629	4 2 ¹	33 8
Dundee - - -	341	3 0 ²	24 4	1,570	4 0	32 0	1,087	4 2 ¹	34 6
Edinburgh - - -	19	3 4 ¹	26 10	3,470	4 0	32 0	369	4 3 ¹	34 6
Falkirk - - -	119	3 7 ¹	28 10	364	4 1 ¹	33 0	259	4 2 ¹	33 8
Glasgow - - -	470	3 7	28 8	1,030	4 0 ²	32 2	526	4 2 ¹	33 10
Perth - - -	101	3 10 ²	31 0	534	4 0	32 0	232	4 3 ¹	34 4
		3 9 ²	30 4		4 0 ²	32 2		4 3 ¹	34 4

With a view to furnishing a means of contrasting the current values of fat cattle per cwt. with the averages for the first quarter of 1897, the reports from the markets above named may be compared as under :—

PLACES.	INFERIOR OR Third Quality.		GOOD OR Second Quality.		PRIME OR First Quality.	
	1898.	1897.	1898.	1897.	1898.	1897.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
Carlisle - - -	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Leeds - - -	25 4	—	29 10	—	32 6	—
Liverpool - - -	28 0	28 0	29 6	29 4	31 10	32 6
London - - -	24 0	26 8	28 0	31 0	32 0	33 4
Newcastle - - -	25 4	28 6	32 10	34 0	37 4	38 6
Shrewsbury - - -	26 4	26 4	29 8	30 0	33 6	35 0
Aberdeen - - -	24 8	25 2	29 8	30 0	33 8	34 4
Dundee - - -	24 4	23 10	32 2	32 4	34 6	35 2
Edinburgh - - -	26 10	27 0	32 0	32 4	34 6	34 6
Falkirk - - -	28 10	—	33 0	34 0	33 8	35 4
Glasgow - - -	28 8	—	32 2	—	33 10	—
Perth - - -	31 0	—	32 0	31 4	34 4	35 6
	30 4	30 6	32 2	32 8	34 4	34 6

These comparisons, with few exceptions in second and third grade cattle, show either stationary or declining values. The largest declines in the prices per cwt. of prime cattle in the first quarter of 1898 were in Liverpool, London, Newcastle, and Edinburgh, the prices at these markets ranging from 32s. to 37s. 4d. per cwt. in 1898, against quotations of 33s. 4d. to 38s. 6d. in 1897.

The number of instances in which fat stock were sold in the scheduled markets by an actual rate per live cwt. was largely increased by the reports from the Auction Mart of Falkirk, where this improved method has been adopted for the whole number of cattle returned as weighed, 742 out of 1,847 shown. Considerable improvement in this direction is reported also from Dundee, Edinburgh, and Glasgow, and altogether a total of 2,090 such transactions against 878 in the same quarter of 1897 indicates a definite advance towards comparable records of this type. The quotations ascertained in this way ranged from 30s. 10d. per cwt. at Edinburgh to 32s. 10d. at London and Dundee for second class stock, and from 32s. per cwt. at Liverpool to 36s. 4d. per cwt. at London for such prime cattle as were disposed of in this manner.

No store cattle were returned as passing over the weighbridge in the three months in the markets above named except at Shrewsbury, where the sale of 1,101 in this fashion was reported. In Scotland the total of store stock weighed, for which prices were given, was 342, the majority of cases being reported from Edinburgh. The total of 1,443, however, contrasts favourably with only 64 in the same months of 1897. The prices of store stock per cwt. live weight ranged from 25s. 4d. at Dundee to 34s. 2d. at Shrewsbury.

The customary table, giving details of the extent of weighing at each scheduled place, will be found on the next page :—

Cattle, Sheep, and Swine, entering the Markets and Marts of the undermentioned Places, with the Number Weighed, as received from the Market Authorities in the **First Quarter** of 1898, under the Markets and Fairs (Weighing of Cattle) Act, 1891 (54 & 55 Vict. c. 70).

PLACES.	Cattle.			Sheep.			Swine.		
	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.
ENGLAND.	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
Ashford - - -	2,481	64	—	13,257	20	—	3,610	—	—
Birmingham - -	6,916	10	10	10,760	—	—	36,568	—	—
Bristol - - -	11,221	28	28	16,757	—	—	—	—	—
Carlisle - - -	10,765	2,549	2,549	48,900	—	—	3,874	—	—
Leicester - - -	11,680	266	220	11,926	6	—	1,311	13	13
Leeds - - -	7,747	435	435	25,005	557	557	871	6	—
Lincoln - - -	1,810	18	16	13,125	—	—	2,380	—	—
Liverpool - - -	14,342	1,276	1,276	46,947	63	63	—	—	—
London - - -	15,910	2,912	1,062	108,920	1,795	—	1,250	—	—
Newcastle-upon-Tyne	23,623	643	643	65,261	8	8	10,317	129	129
Norwich - - -	21,571	82	—	45,040	—	—	6,403	—	—
Salford - - -	33,403	466	—	94,436	138	—	387	112	—
Shrewsbury - - -	9,397	1,147	1,147	7,532	—	—	1,961	2	2
Wakefield - - -	19,278	403	—	41,179	496	—	—	—	—
York - - -	20,587	9	8	21,707	—	—	1,253	—	—
SCOTLAND.									
Aberdeen - - -	13,257	5,472	5,472	11,101	4,864	4,864	3,951	—	—
Dundee - - -	4,124	3,038	3,015	5,959	1,575	1,575	487	—	—
Edinburgh - - -	16,126	6,978	*4,123	52,654	—	—	1,614	—	—
Falkirk - - -	1,847	742	742	1,063	—	—	19	—	—
Glasgow - - -	19,823	2,238	2,055	72,075	38	18	1,625	—	—
Perth - - -	9,680	2,297	*867	45,318	1,677	1,677	3,023	87	87
TOTAL for ENGLAND	210,731	10,308	7,394	570,752	3,083	628	70,185	262	144
TOTAL for SCOTLAND	64,857	20,765	*16,274	188,170	8,154	8,134	10,719	87	87
Total - -	275,588	31,073	*23,668	758,922	11,237	8,762	80,904	349	231

* Prices for 2,855 cattle in addition to the above were quoted from Edinburgh, and for 1,430 cattle from Perth, but without distinguishing the quality.

PRICES OF MEAT, CORN, AND DAIRY PRODUCE.

AVERAGE PRICES of DEAD MEAT, per Stone of 8 lbs., at the LONDON CENTRAL MEAT MARKET, during the first Quarter, and during the Months of February, March, April, and May, 1898.

Compiled from the prices quoted weekly in the "Meat Trades Journal.")

DESCRIPTION.	1ST QUARTER 1898.		FEBRUARY, 1898.		MARCH, 1898.		APRIL, 1898.		MAY, 1898.						
BEEF :—	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.					
Scotch, short sides - -	3	10 to 4	1	2	10 to 4	2	3	9 to 4	0	3	9 to 4	1	3	11 to 4	2
„ long sides - -	3	7 „ 3	9	3	7 „ 3	9	3	6 „ 3	9	3	7 „ 3	9	3	7 „ 3	9
English - - -	3	6 „ 3	8	3	6 „ 3	8	3	6 „ 3	7	3	6 „ 3	8	3	7 „ 3	8
Cows and Bulls - -	1	11 „ 2	9	2	0 „ 2	9	2	0 „ 2	9	1	11 „ 2	8	1	10 „ 2	6
American, Birkenh'd killed	3	1 „ 3	4	3	2 „ 3	5	3	1 „ 3	4	3	1 „ 3	4	3	2 „ 3	5
„ Deptford killed	3	1 „ 3	5	3	2 „ 3	5	3	0 „ 3	4	3	0 „ 3	3	3	2 „ 3	5
Argentine „ „ -	2	7 „ 2	11	2	8 „ 3	0	2	6 „ 2	10	2	4 „ 2	9	2	6 „ 2	10
American Refrig. hind-qrs	3	3 „ 3	6	3	5 „ 3	8	3	3 „ 3	6	3	2 „ 3	6	3	6 „ 3	9
„ „ fore-qrs	2	4 „ 2	6	2	5 „ 2	7	2	3 „ 2	6	2	3 „ 2	5	2	1 „ 2	4
Austral'n, Froz'n hind-qrs	1	11 „ 2	3	1	11 „ 2	3	1	10 „ 2	2	2	0 „ 2	3	2	1 „ 2	3
„ „ fore-qrs	1	7 „ 1	9	1	7 „ 1	10	1	8 „ 1	10	1	9 „ 1	10	1	10 „ 1	11
New Zealand hind-qrs -	2	3 „ 2	5	2	3 „ 2	5	2	2 „ 2	4	2	3 „ 2	5	2	3 „ 2	5
MUTTON :—															
Scotch, Prime - - -	4	1 „ 4	8	4	2 „ 4	10	4	0 „ 4	6	3	11 „ 4	6	3	11 „ 4	8
English, Prime - - -	3	11 „ 4	6	4	0 „ 4	7	3	11 „ 4	5	3	8 „ 4	4	3	8 „ 4	5
Ewes - - -	2	10 „ 3	6	3	0 „ 3	8	2	10 „ 3	5	2	8 „ 3	3	2	9 „ 3	3
Continental - - -	3	10 „ 4	1	4	0 „ 4	2	3	11 „ 4	2	3	11 „ 4	2	4	0 „ 4	3
River Plate, Town killed	3	2 „ 3	4	3	5 „ 3	6	2	11 „ 3	2	2	8 „ 2	11	2	10 „ 3	1
New Zealand, Frozen -	1	8 „ 2	5	1	8 „ 2	4	1	8 „ 2	6	1	10 „ 2	8	1	10 „ 2	7
Australian, Frozen - -	1	8 „ 1	10	1	6 „ 1	7	1	9 „ 2	0	1	8 „ 1	11	1	9 „ 1	11
River Plate, Frozen -	1	8 „ 1	9	1	6 „ 1	7	1	9 „ 1	11	1	9 „ 1	10	1	9 „ 1	11
LAMB :—															
English - - -	—	—	—	—	—	—	—	—	—	5	10 „ 7	1	5	6 „ 6	8
New Zealand, Frozen -	3	7 „ 4	0	4	3 „ 4	7	3	0 „ 3	5	2	8 „ 3	1	2	6 „ 2	9
VEAL :—															
English - - -	4	4 „ 4	9	4	5 „ 4	11	4	5 „ 5	0	4	5 „ 4	11	4	1 „ 4	5
Foreign - - -	3	9 „ 4	2	3	11 „ 4	3	3	10 „ 4	3	3	7 „ 4	3	3	6 „ 3	11
PORK :—															
English, best - - -	4	2 „ 4	6	4	2 „ 4	6	4	3 „ 4	7	4	2 „ 4	7	4	0 „ 4	5
„ secondary -	3	5 „ 3	11	3	6 „ 3	11	3	6 „ 4	0	3	7 „ 4	1	3	6 „ 3	10
Foreign - - -															

AVERAGE WHOLESALE PRICES of CATTLE and SHEEP, per Stone of 8 lbs., sinking the offal, at the METROPOLITAN CATTLE MARKET, during the undermentioned Quarters of 1897 and 1898.

PERIOD.	CATTLE.			SHEEP.		
	Inferior.	Second.	First.	Inferior.	Second.	First.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
1st Quarter, 1897	2 5	3 11	4 6	3 9	5 1	5 9
2nd Quarter ,,	2 5	4 0	4 7	3 10	4 11	5 8
3rd Quarter ,,	2 4	4 0	4 7	3 7	5 0	5 8
4th Quarter ,,	2 4	3 10	4 5	3 4	4 11	5 7
1st Quarter, 1898	2 4	3 9	4 4	3 4	5 1	5 9

AVERAGE WHOLESALE PRICES OF BEEF and MUTTON, per Stone of 8 lbs., by the Carcase, at LIVERPOOL and GLASGOW, during the undermentioned Quarters of 1897 and 1898.

PERIOD.	LIVERPOOL.*				GLASGOW.†			
	BEEF.		MUTTON.		BEEF.		MUTTON.	
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
1st Quarter, 1897	2 8	to 3 6	3 4	to 5 2	2 8	to 4 0	4 0	to 5 0
2nd Quarter ,,	2 8	„ 3 6	2 8	„ 5 4	2 8	„ 4 0	3 4	„ 4 10
3rd Quarter ,,	2 8	„ 3 8	3 4	„ 4 8	2 4	„ 3 8	3 4	„ 4 4
4th Quarter ,,	2 0	„ 3 5	2 10	„ 4 10	2 4	„ 3 8	3 0	„ 4 6
1st Quarter, 1898	2 0	„ 3 6	3 4	„ 4 8	2 4	„ 3 8	3 0	„ 4 8

* Compiled from information furnished by the Medical Officer of Health, Liverpool. The prices quoted are for Carcases of Animals *slaughtered at the Liverpool Abattoir*, and do not apply to Imported Meat.

† Compiled from information furnished by the Principal of the Veterinary College, Glasgow.

BERLIN MARKET.

AVERAGE PRICES of CATTLE and SHEEP (First Quality Dead Weight) in the BERLIN CATTLE MARKET in the under-mentioned Months of 1898.

MONTHS.	CATTLE.		SHEEP.	
	Per Cwt.		Per Cwt.	
1898.	s. d.	s. d.	s. d.	s. d.
March - - - -	58 0	to 61 4	55 3	to 58 0
April - - - -	57 6	„ 62 4	55 3	„ 57 6
May - - - -	59 1	„ 62 1	56 0	„ 58 0

NOTE.—The above prices have been compiled from the weekly returns published in the *Deutsche Landwirtschaftliche Presse*.

PARIS MARKET.

AVERAGE PRICES of CATTLE, SHEEP, and SWINE (Medium Quality) in the PARIS CATTLE MARKET in the under-mentioned Months of 1898.

MONTHS.	OXEN.	CALVES.	SHEEP.	PIGS.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
LIVE WEIGHT.				
1898.	s. d.	s. d.	s. d.	s. d.
March - - -	28 2	39 11	38 5	37 0
April - - -	29 4	40 1	36 3	39 6
May - - -	32 6	41 2	34 11	41 9
DEAD WEIGHT.				
1898.	s. d.	s. d.	s. d.	s. d.
March - - -	53 7	73 6	70 0	53 3
April - - -	54 4	73 6	71 6	56 10
May - - -	54 2	73 4	70 1	59 6

NOTE.—The above prices have been compiled from the weekly returns published in the *Journal d'Agriculture Pratique*.

CHICAGO.

PRICES of CATTLE at CHICAGO per Cwt. (Live Weight) in the under-mentioned Months of 1898.

Months.	Good Dressed Beef and Shipping Steers.		Export Cattle.		Extra Prime Cattle.	
1898.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
March - -	21 0	to 24 9	21 0	„ 26 2	26 2	„ 27 6
April - -	19 10	„ 24 3	19 10	„ 25 8	24 6	„ 26 10
May - -	19 10	„ 23 10	19 7	„ 24 9	23 4	„ 25 8

Compiled from the Live Stock Reports issued by Messrs. Clay, Robinson, and Co., of the Union Stock Yards, Chicago, Illinois.

AVERAGE VALUES, per Cwt., of various Kinds of DEAD MEAT Imported into the United Kingdom from FOREIGN COUNTRIES and BRITISH POSSESSIONS in the under-mentioned Quarters of 1897 and 1898.

(Computed from the Trade and Navigation Accounts.)

PERIOD.	BEEF.		MUTTON.	PORK.		BACON.	HAMS.
	Fresh.	Salted.	Fresh.	Fresh.	Salted.		
1st Quarter, 1897 -	s. d. 39 4	s. d. 25 9	s. d. 27 4	s. d. 44 11	s. d. 23 4	s. d. 33 5	s. d. 41 9
2nd Quarter „ -	40 1	23 10	32 0	43 11	20 10	35 11	43 5
3rd Quarter „ -	37 2	24 7	30 9	43 3	20 3	35 10	43 5
4th Quarter „ -	37 7	24 9	30 5	43 7	21 2	36 9	41 2
1st Quarter, 1898 -	40 8	25 11	28 10	42 11	25 10	34 6	39 9

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels,* computed from the Weekly Averages of Corn Returns from the 196 Returning Markets of ENGLAND AND WALES, pursuant to the Corn Returns Act, 1882, together with the QUANTITIES returned as sold at such Markets, in the under-noted periods of the Years 1898, 1897, and 1896.

QUARTER ENDED	PRICES.			QUANTITIES.		
	1898.	1897.	1896.	1898.	1897.	1896.
Wheat.						
Lady Day - - -	<i>s. d.</i> 35 1	<i>s. d.</i> 29 7	<i>s. d.</i> 25 8	<i>Quarters.</i> 699,657	<i>Quarters.</i> 619,679	<i>Quarters.</i> 448,047
Midsummer - - -	—	27 6	25 2	—	619,618	384,559
Michaelmas - - -	—	30 4	23 7	—	635,698	505,988
Christmas - - -	—	33 3	30 5	—	881,566	772,427
Barley.						
Lady Day - - -	<i>s. d.</i> 27 9	<i>s. d.</i> 24 0	<i>s. d.</i> 22 5	<i>Quarters.</i> 902,452	<i>Quarters.</i> 784,713	<i>Quarters.</i> 955,902
Midsummer - - -	—	21 4	21 4	—	78,488	92,739
Michaelmas - - -	—	21 6	21 0	—	118,875	165,722
Christmas - - -	—	27 0	27 1	—	2,275,111	2,177,499
Oats.						
Lady Day - - -	<i>s. d.</i> 17 5	<i>s. d.</i> 16 4	<i>s. d.</i> 13 9	<i>Quarters.</i> 226,150	<i>Quarters.</i> 194,193	<i>Quarters.</i> 259,565
Midsummer - - -	—	17 3	14 3	—	79,707	99,672
Michaelmas - - -	—	17 10	14 6	—	75,824	94,383
Christmas - - -	—	16 5	16 7	—	200,710	201,533

* Section 8 of the Corn Returns Act, 1882, provides that where returns of purchases of British Corn are made to the local inspector of Corn Returns in any other measure than the imperial bushel or by weight or by a weighed measure, that officer shall convert such returns into the imperial bushel, and in the case of weight or weighed measure the conversion is to be made at the rate of 60 imperial pounds for every bushel of wheat, 50 imperial pounds for every bushel of barley, and 39 imperial pounds for every bushel of oats.

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Returns received under the Corn Returns Act, 1882, in each of the under-mentioned Weeks in 1898, and in the corresponding Weeks in 1897 and 1896.

Weeks ended (in 1898).	Wheat.			Barley.			Oats.		
	1898.	1897.	1896.	1898.	1897.	1896.	1898.	1897.	1896.
Jan. 1 -	s. d. 34 6	s. d. 30 6	s. d. 25 2	s. d. 27 3	s. d. 24 8	s. d. 24 7	s. d. 17 1	s. d. 16 2	s. d. 13 10
" 8 -	34 11	31 1	25 4	27 9	25 5	23 11	16 10	16 3	13 9
" 15 -	35 0	31 8	25 10	27 8	24 10	23 6	17 4	16 5	13 11
" 22 -	34 11	31 7	26 1	27 10	25 5	23 7	17 5	16 6	13 10
" 29 -	34 6	31 3	26 3	27 8	24 7	23 1	17 2	16 8	14 1
Feb. 5 -	34 10	30 7	26 4	28 0	24 10	22 5	17 6	16 7	14 0
" 12 -	35 1	29 8	26 7	27 8	24 8	21 11	17 5	16 6	14 0
" 19 -	35 0	28 11	26 3	27 11	23 9	21 10	17 8	16 5	13 9
" 26 -	35 5	28 2	25 6	27 6	23 8	21 10	17 10	16 3	13 10
Mar. 5 -	35 10	28 3	25 4	28 0	23 0	21 5	17 11	16 3	13 8
" 12 -	35 8	27 11	25 5	27 10	22 11	21 3	17 9	16 2	13 10
" 19 -	35 6	27 11	25 1	28 0	22 8	21 1	17 10	16 2	13 9
" 26 -	35 4	27 9	24 10	28 6	22 5	21 4	17 8	16 3	13 4
Apl. 2 -	35 3	27 10	24 7	27 11	22 3	21 10	17 10	16 3	13 3
" 9 -	35 2	27 8	24 6	27 0	22 7	21 0	17 11	16 6	13 1
" 16 -	35 3	27 0	24 11	28 0	23 0	23 6	18 2	16 3	14 0
" 23 -	36 1	26 6	25 6	28 3	20 7	21 0	18 4	16 7	13 11
" 30 -	38 4	27 9	25 8	27 10	20 5	22 6	18 11	17 3	14 3
May 7 -	42 4	28 4	25 7	27 8	21 5	21 0	20 4	16 11	14 4
" 14 -	45 11	27 11	25 7	27 1	20 2	21 0	21 1	17 7	14 5
" 21 -	48 1	28 1	25 6	26 0	19 10	21 8	21 3	17 9	14 6
" 28 -	47 9	28 2	25 4	26 5	21 3	21 5	21 5	17 10	14 10
June 4 -	46 3	27 10	25 5	26 10	20 8	21 6	21 0	17 9	14 8
" 11 -	45 4	27 4	25 1	25 8	22 8	19 3	20 11	17 11	14 9
" 18 -	42 4	27 0	25 1	26 1	23 9	22 8	20 5	18 0	15 1
" 25 -		27 0	24 10		19 9	19 5		18 6	14 10
July 2 -		27 1	24 9		18 10	16 2		18 7	15 0
" 9 -		27 4	24 7		17 4	18 11		18 8	14 9
" 16 -		27 7	24 2		17 6	18 3		18 3	15 4
" 23 -		28 1	24 0		18 10	19 8		18 11	15 0
" 30 -		28 10	23 8		17 10	19 7		19 0	14 10
Aug. 6 -		29 5	23 6		17 9	19 5		18 11	14 9
" 13 -		29 8	22 11		19 0	21 1		17 4	14 6
" 20 -		30 4	22 4		19 2	21 11		17 2	14 3
" 27 -		31 8	22 5		22 5	21 10		17 1	13 7
Sept. 3 -		33 7	23 1		25 11	21 11		17 0	13 11
" 10 -		33 1	23 9		27 4	23 4		17 3	14 1
" 17 -		33 10	24 0		28 11	24 8		17 0	14 6
" 24 -		33 11	24 4		29 7	26 3		16 8	14 1
Oct. 1 -		33 4	25 2		29 10	28 7		16 4	14 9
" 8 -		32 1	26 7		28 9	29 5		16 0	15 3
" 15 -		31 10	27 10		28 3	29 7		16 1	15 9
" 22 -		32 2	28 11		27 5	28 6		16 2	16 0
" 29 -		32 10	30 9		27 5	28 3		16 0	17 3
Nov. 5 -		33 5	31 6		26 10	27 5		16 5	17 6
" 12 -		34 0	31 9		26 3	27 3		16 3	17 7
" 19 -		33 11	32 11		26 2	26 8		16 5	17 7
" 26 -		33 8	33 4		25 9	26 9		16 8	17 7
Dec. 3 -		33 9	32 8		25 10	26 2		16 9	17 0
" 10 -		33 9	32 2		26 0	25 4		16 6	16 8
" 17 -		34 1	31 3		26 4	24 10		17 0	16 7
" 24 -		34 4	30 9		26 11	24 1		17 0	16 1

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in BELGIUM in the under-mentioned Months of 1898.

Month.	Wheat.	Barley.	Oats.
1898.	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
January - - - -	35 0	21 0	17 6
February - - - -	35 7	22 11	17 9
March - - - -	36 3	23 3	18 3
April - - - -	40 3	24 9	21 1
May - - - -	47 3	25 7	22 10

The above prices have been compiled from the official monthly averages published in the *Moniteur Belge*.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in FRANCE, and ENGLAND and WALES in the under-mentioned Months of 1898.

MONTH.	FRANCE.	ENGLAND.
WHEAT.		
1898.	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>
March - - - -	49 10	35 7
April - - - -	51 0	36 0
May - - - -	54 2	46 0
BARLEY.		
1898.	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>
March - - - -	24 5	28 1
April - - - -	24 8	27 9
May - - - -	26 10	26 9
OATS.		
1898.	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>
March - - - -	20 8	17 9
April - - - -	20 10	18 2
May - - - -	23 5	21 0

Note.—The prices of French grain have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*. The prices of British grain are official averages based on the weekly returns furnished under the Corn Returns Act, 1882.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per
IMPERIAL QUARTER at the under-mentioned Markets in
the under-mentioned Months of 1898.

Month.	London.	Paris.	Breslau.
WHEAT.			
1898.	Per Qr. s. d.	Per Qr. s. d.	Per Qr. s. d.
March - - -	36 1	50 7	41 5
April - - -	36 10	51 2	36 4 to 42 8
May - - -	45 9	54 5	45 7 „ 50 2
BARLEY.			
1898.	Per Qr. s. d.	Per Qr. s. d.	Per Qr. s. d.
March - - -	23 1	23 3	30 10
April - - -	25 2	24 0	27 4 to 30 10
May - - -	27 0	26 5	26 10 „ 30 1
OATS.			
1898.	Per Qr. s. d.	Per Qr. s. d.	Per Qr. s. d.
March - - -	18 4	20 2	21 8
April - - -	18 9	21 2	21 0 to 21 10
May - - -	21 6	25 6	23 2 „ 24 1

Note.—The London quotation represents the price of British corn as returned under the Corn Returns Act, 1882; the price of grain in Paris is the official average price of French wheat in that city; the quotations shown for Breslau represent the prices of grain of good merchantable quality.

PRICES OF WOOL.

PRICES OF ENGLISH WOOL, per pack of 240 lbs., in the
under-mentioned Months of 1898.

(Compiled from the *Economist*.)

DESCRIPTION.	March.	April.	May.
	£ s. £ s.	£ s. £ s.	£ s. £ s.
South Down - -	8 10 to 10 0	8 10 to 10 0	8 10 to 10 0
Half breds -- -	8 5 „ 9 3	8 0 „ 9 0	8 0 „ 9 0
Leicester - - -	8 10 „ 9 0	8 10 „ 9 0	8 10 „ 9 0
Kent Fleeces - -	8 0 „ 9 0	8 0 „ 9 0	8 0 „ 9 0

III.—PRICES OF BUTTER, MARGARINE, AND CHEESE.

MEAN WHOLESALE PRICES OF BUTTER, MARGARINE, and CHEESE in the under-mentioned Months of 1898.

(Compiled from the *Grocer*.)

DESCRIPTION.	March. 1898.		April. 1898.		May. 1898.	
	Per Cwt.		Per Cwt.		Per Cwt.	
	s.	d.	s.	d.	s.	d.
BUTTER :						
Cork, 1sts - -	106	0	96	0	80	6
„ 2nds - -	97	0	88	0	77	0
„ 3rds - -	91	0	83	6	74	6
„ 4ths - -	64	0	70	6	71	0
Friesland - -	96	0 to 99	87	0 to 91	77	0 to 79
Dutch Factories	99	0 „ 103	90	6 „ 93	78	6 „ 82
French Baskets -	112	0 „ 121	101	0 „ 109	91	0 „ 98
„ Crocks and Firkins -	104	0 „ 110	91	0 „ 96	84	0 „ 88
„ 2nds and 3rds	86	6 „ 100	83	0 „ 87	79	0 „ 82
Danish and Swedish -	107	6 „ 112	97	0 „ 101	88	0 „ 92
Finnish - -	93	0 „ 103	87	0 „ 93	80	0 „ 85
Russian - -	80	0 „ 90	80	0 „ 91	78	0 „ 83
Canadian and States -	60	0 „ 97	60	0 „ 95	80	0 „ 90
Argentine - -	101	0 „ 111	98	6 „ 103	90	0 „ 94
Colonial, fine- -	98	6 „ 107	88	6 „ 98	86	0 „ 96
„ good and -						
inferior -	70	0 „ 93	70	0 „ 84	70	0 „ 80
Fresh Rolls (Foreign) per doz. - -	11	0 „ 14	10	0 „ 13	9	0 „ 12
MARGARINE :						
Margarine - -	28	0 „ 56	28	6 „ 56	30	0 „ 56
Mixtures - -	50	0 „ 80	50	6 „ 84	49	6 „ 83
CHEESE :						
Cheddar - -	47	0 „ 70	48	0 „ 70	48	0 „ 72
Somerset - -	50	6 „ 64	50	0 „ 64	49	0 „ 65
Cheshire - -	71	6 „ 81	76	0 „ 80	76	0 „ 80
Wiltshire - -	60	0 „ 70	60	0 „ 64	58	0 „ 62
Double Gloucester -	48	0 „ 60	47	0 „ 60	44	0 „ 53
Derby - -	—		—		51	0 „ 54

WEEKLY PRICES (WHOLESALE) of VEGETABLES and FRUIT at COVENT GARDEN MARKET.

(Compiled from the *Gardeners' Chronicle*.)

	Week ending															
	5th May.		12th May.		19th May.		26th May.									
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.								
VEGETABLES—																
Artichokes, Globe, per dozen	1	6 to 2	0	1	3 to 2	0	2	6 to 3	6	1	3 to 2	6				
Asparagus, English, per bundle	4	0,,	4	6	4	0	—	3	0,,	4	0	3	0,,	4	0	
Asparagus, Worcester	2	0,,	2	6	1	3,,	2	0	1	0,,	1	3	1	0,,	1	2
Beans, English, Dwarf, per lb.	0	9	—	0	9,,	1	0	1	0	—	1	0,,	1	2	—	—
Beans, Channel Islands, per lb.	1	0	—	0	8,,	1	0	1	0	—	1	0	—	—	—	—
Beetroots, per bushel	2	6	—	2	6	—	2	6	—	2	6	—	3	0	—	—
Broccoli, per dozen	0	6,,	1	6	0	6,,	1	6	0	6,,	1	0	0	6,,	1	0
Cabbage, per dozen	0	6,,	0	8	0	6,,	0	8	0	6,,	0	8	0	6,,	—	—
Carrots, in bags, washed	3	0,,	3	6	3	0,,	3	6	2	6,,	3	0	2	0,,	2	6
Carrots, New, per dozen bunches	4	0	—	4	0	—	5	0,,	6	0	8	0,,	12	0	—	—
Celery, per dozen rolls	12	0,,	15	0	12	0,,	15	0	12	0,,	18	0	12	0	—	—
Cucumbers, per dozen	1	6,,	3	0	2	0,,	3	6	2	0,,	3	6	2	0	3	0
Endive, new, per dozen	1	0,,	1	6	2	6	—	1	6	—	1	0	1	0	1	6
Horseradish, Cheshire (loose), per dozen	2	0	—	2	0	—	2	0	—	2	0	—	2	0	—	—
Lettuce Cabbage, per dozen	0	6,,	0	9	0	9,,	0	10	0	6,,	0	10	0	6,,	0	8
Mushrooms, per lb.	0	6,,	0	10	0	6,,	0	8	0	6,,	0	8	0	6,,	0	8
Onions, Green, per dozen bunches	1	6,,	2	0	1	6,,	2	6	1	6,,	2	0	1	6,,	2	6
Parsley, per sieve	0	9	—	0	9	—	0	9	—	0	9	—	0	9	—	—
Parsnips, per bag	1	6,,	2	0	1	6	2	0	1	6	—	1	6	—	—	—
Peas, flats	2	6,,	5	6	3	0,,	4	6	2	6,,	3	6	2	6,,	3	6
Peas, Telephone, per lb.	0	6,,	0	8	0	9	—	0	9,,	1	0	0	9,,	1	0	—
Potatoes, Channel Islands, Kidneys, per cwt.	—	—	—	—	—	—	—	20	0,,	21	0	18	0,,	19	0	—
Potatoes, Canary, Kidneys, per cwt.	14	0,,	17	0	15	0,,	20	0	16	0,,	18	0	16	0,,	18	0
Potatoes, Maincrop, per ton	110	0,,	130	0	110	0,,	130	0	120	0,,	140	0	120	0,,	150	0
Potatoes, Dunbar Maincrop, per ton	140	0	—	140	0,,	145	0	150	0,,	155	0	150	0	—	—	—
Potatoes, Jersey, New, per cwt.	—	—	—	—	26	0,,	27	0	18	0,,	20	0	16	0,,	18	0
Radishes, round, per dozen bunches	0	3,,	1	0	1	0,,	1	6	0	8,,	1	0	0	8,,	1	0
Rhubarb, home-grown per dozen	1	0,,	2	6	1	0,,	2	6	1	0,,	2	6	1	6,,	3	6
Spinach, per bls.	0	6,,	1	0	0	6,,	0	9	0	6,,	0	9	1	0	—	—
Tomatoes, English, per lb.	0	8,,	0	10	0	8,,	0	10	0	6,,	0	9	0	6,,	0	8
Tomatoes, Canary, deep boxes	2	6,,	3	6	2	0,,	3	0	2	6,,	4	0	2	6,,	4	0
Watercress, per dozen bunches	0	6,,	0	8	0	6,,	0	8	0	4,,	0	8	0	4,,	0	8
FRUIT—																
Apples, South Australian, cases	17	0,,	20	0	—	—	—	15	0,,	20	0	15	0,,	18	0	—
Apples, Tasmanian, cases	12	0,,	17	0	12	0,,	18	0	10	0,,	15	0	10	0,,	15	0
Cherries, per box	1	0,,	1	6	0	10,,	1	2	1	3,,	2	6	1	3,,	2	6
Cherries, sieves	—	—	—	—	—	—	—	7	0,,	8	6	6	0,,	8	0	—
Grapes, English, per lb.	3	0,,	4	0	3	0,,	4	0	2	0,,	2	3	2	0,,	2	3
Grapes, Jersey, per lb.	3	0,,	3	6	3	0,,	3	6	1	6,,	2	0	1	6,,	2	0
Grapes, Belgium, per lb.	—	—	—	—	1	4,,	1	9	1	0,,	1	6	1	0,,	1	6
Gooseberries, per quart	1	6	—	0	6,,	0	8	—	—	—	—	—	—	—	—	—
Gooseberries, per sieve	—	—	—	—	—	—	—	7	0,,	8	0	6	0,,	7	0	—
Peaches, per dozen	12	0,,	24	0	12	0,,	18	0	15	0,,	24	0	15	0,,	24	0
Peaches, 2nd quality	—	—	—	—	6	0,,	8	0	4	0,,	8	0	4	0,,	8	0
Pines, each	2	0,,	5	0	2	0,,	5	0	2	0,,	4	6	2	6,,	5	0
Strawberries, per lb.	1	6,,	4	0	1	3,,	4	0	2	6,,	4	0	2	6,,	4	0
Strawberries, per lb. (2nd quality)	—	—	—	—	—	—	—	1	0,,	1	6	1	0,,	1	3	—

DISEASES OF ANIMALS IN GREAT BRITAIN.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Board of Agriculture, in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUTBREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUTBREAKS Confirmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
December, 1896 -	—	—	—	815	15,806
March, 1897 -	2	14	450	785	13,544
June, 1897 -	3	25	197	700	13,131
September, 1897 -	1	4	71	392	8,026
December, 1897 -	1	3	23	278	5,731
March, 1898 -	1	1	220	578	11,466

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax** and **Glanders** in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).	
	OUTBREAKS Reported.	ANIMALS Attacked.	OUTBREAKS Reported.	ANIMALS Attacked.
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
December, 1896 -	118	219	213	331
March, 1897 -	129	306	196	341
June, 1897 -	109	201	230	393
September, 1897 -	93	171	249	437
December, 1897 -	102	204	225	458
March, 1898 -	157	246	197	381

NUMBER OF CASES of **Rabies** in DOGS in GREAT BRITAIN during each of the under-mentioned periods.

THREE MONTHS ENDED	Number of Cases.
31st December, 1896 -	49
31st March, 1897 -	48
30th June, 1897 -	42
30th September, 1897 -	40
31st December, 1897 -	21
31st March, 1898 -	8

DISEASES OF ANIMALS IN IRELAND.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Lord Lieutenant and Privy Council in IRELAND, in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUT- BREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUT- BREAKS Con- firmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
December, 1896 -	—	—	—	60	2,794
March, 1897 -	—	—	142	122	1,149
June, 1897 -	—	—	—	136	1,571
September, 1897 -	—	—	—	120	749
December, 1897 -	—	—	—	38	655
March, 1898 -	—	—	144	81	1,039

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax**, **Glanders**, and **Rabies** in Ireland in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).		Rabies.	
	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	CASES REPORTED.	
					DOGS.	OTHER ANIMALS.
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
Dec., 1896 -	—	—	—	1	74	29
March, 1897 -	—	—	—	—	118	19
June, 1897 -	1	1	1	2	139	41
Sept., 1897 -	—	—	1	1	110	29
Dec., 1897 -	—	—	—	—	26	16
March, 1898 -	1	8	—	—	13	2

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SALES.—A depositor who buys Stock in this way can sell the whole or part of it at any time through the Post Office Savings Bank.

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LIST OF LEAFLETS ISSUED BY THE BOARD OF AGRICULTURE.

Number.	Title.
Leaflet No. 1	Mites on Currant and Nut Trees.
" " 2	Vine and Raspberry Weevils.
" " 3	The Turnip Fly or Flea.
" " 4	Caterpillars on Fruit Trees.
" " 5	The Mangel Wurzel Fly.
" " 6	The Field Vole.
" " 7	Autumn Catch Crops and Fodder Supply.
" " 8	Farmers and Assessments to Local Rates.
" " 9	Ensilage.
" " 10	Wireworms.
" " 11	The Daddy Longlegs.
" " 12	The Gooseberry Saw-Fly.
" " 13	Acorn Poisoning.
" " 14	The Raspberry Moth.
" " 15	The Apple Blossom Weevil.
" " 16	The Apple Sucker.
" " 17	Preservation of Commons.
" " 18	Fertilisers and Feeding Stuffs Act.
" " 19	Pea and Bean Weevil.
" " 20	The Magpie Moth.
" " 21	The Warble Fly.
" " 22	The Diamond Back Moth.
" " 23	Potato Disease.
" " 24	The Ribbon Footed Corn-Fly.
" " 25	The Cockchafer.
" " 26	Farmers and the Income Tax.
" " 27	Remission of Tithe Rentcharge.
" " 28	Anthrax.
" " 29	Swine Fever.
" " 30	The Codlin Moth.
" " 31	The Onion Fly.
" " 32	Foul Brood or Bee Pest.
" " 33	Surface Caterpillars.
" " 34	The Woolly Aphis or American Blight
" " 35	The Celery Fly.
" " 36	Cultivation of Osiers.
" " 37	Rabies.
" " 38	The Carrot Fly.
" " 39	Assessments to Land Tax.
" " 40	The Kestrel or Windhover.
" " 41	The Red Spider or Spinning Mite.
" " 42	The Short-eared Owl.
" " 43	Titmice.
" " 44	The Common Lapwing or Plover.
" " 45	The Starling.
" " 46	The Stem Eelworm.
" " 47	The Asparagus Beetle.



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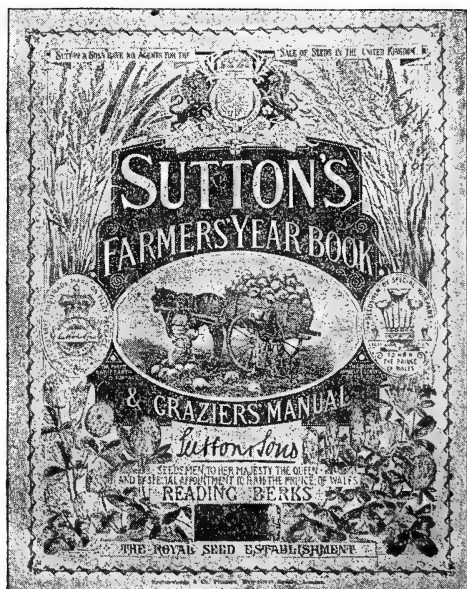
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TO H.R.H.
THE PRINCE OF WALES

The Journal

OF THE

BOARD OF AGRICULTURE

SEPTEMBER, 1898.

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THE JOURNAL OF THE BOARD OF AGRICULTURE.

Vol. V. No. 2. SEPTEMBER, 1898.

ENGLISH ORCHARDS.

*Part II.**

Among the insects that injure apple trees the woolly aphis (*Schizoneura lanigera*) causes the most harm to the trees themselves. This insect may be at once recognised by the white patches, which are colonies of aphides covered with a substance like wool, upon the trunks and branches, and especially upon wounds and scars caused by rough pruning, or lopping off branches, or by the rubbing of stakes. Infestation extends gradually from these centres, abnormal growths are formed, and the whole tree becomes seriously injured, and not infrequently dies, before the origin of the mischief has been recognised. In many orchards the harmful work of this aphis has been going on undisturbed for many years, not only upon the branches but also upon the roots, where it does great harm. The growth of lichens and mosses upon the limbs and branches very often conceals the dangerous spread of the woolly aphis. Apple trees should be periodically examined for this pest, and if it is discovered on them the trees should be sprayed in the autumn with strong kerosene emulsion: made by dissolving $\frac{3}{4}$ lb. of soft soap in a gallon of boiling water (rain water should be used, or soda added), and adding two gallons

* Continued from Vol. V. No. 1, June, 1898.

of kerosene. After churning up this mixture, by means of a force-pump, until it becomes creamy, twenty gallons of water should be added to it, and the whole well stirred. Two sprayings with this should be sufficient to kill all the woolly aphides. When they are on the trunk, the emulsion, made a little thicker, should be worked in with a whitewash brush. In America the root-inhabiting form of this aphid is checked by the application of finely-powdered tobacco dust; the earth is removed, the tobacco dust is put on, and the earth laid gently over it. In planting apple trees the roots should be dipped in strong kerosene emulsion to kill any woolly aphides that may be upon them.

Apple trees are infested by many pests in the early spring time, notably by the caterpillars of at least five moths, which sometimes clear off both foliage and blossoms. As the female moths are without wings and crawl up the trees to lay their eggs upon the twigs, they may to a very great extent be prevented from ascending by fastening bands of greasy or sticky paper, or other material, round the trunks. Upon the best managed fruit land it is customary to band the trees regularly in the autumn as a part of the ordinary practice; just as it is usual for good managers upon the slightest indications of caterpillars on the leaves to spray every part of the trees thoroughly. The swelling buds are examined with a magnifying glass to ascertain whether there are any caterpillars present, as in their early stages they are only about the twelfth of an inch long, and as fine as threads, and if any are found, spraying is done at once with strong solutions of quassia: the extract of 8 or 9 lbs. of quassia with 7 lbs. of soft soap to 100 gallons of water. This, sprayed over the branches by means of strong garden engines fitted with extra powerful pumps, makes the leaves and blossoms distasteful to the caterpillars, and gives them a chance to grow away from their attacks. It would be well to repeat the spraying at short intervals, as there is a succession of caterpillars for some weeks in the spring. Spraying with arsenical washes, made of Paris Green and London Purple, is adopted very generally by American producers of apples in order

to kill caterpillars and other leaf-and-blossom biting insects on the trees. The quantity used is about 1 lb. of the poison with 190 to 225 gallons of water.

Systematic spraying would destroy numbers of apple aphides (*Aphis mali*) and the *Psylla mali*, the apple sucker, which has shown in late years a great tendency to increase, and has been very troublesome in many orchards. The apple-blossom weevil (*Anthonomus pomorum*), a perfect pest in some localities, would also be kept in check by regular sprayings, which serve to make its surroundings unpleasant or impregnate its food with disagreeable qualities. The ravages of this insect, which is fearfully destructive in French orchards, are hardly realised in this country, as it is so small, and the larva which causes the harm is concealed in the heart of the bud. The ragged coverings of bark which are never scraped away, and the dense growth of lichens and mosses allowed to remain from generation to generation, afford winter shelter for this weevil, which emerges in the spring and places eggs in the nearest flower-buds.

The regular removal of superfluous bark, and daubing the trunks with lime and sulphur wash with which some paraffin is mixed, would spoil the winter resorts of many injurious insects, notably those of the caterpillars of perhaps the most annoying of the apple-infesting tribe, the Codlin moth (*Carpocapsa pomonella*), which has likewise increased in a most marked degree in English orchards. In some seasons large percentages of the apples are bored by these caterpillars, and the appearance and flavour of the fruit greatly injured. As these caterpillars fall from, or crawl out of, the infested apples and ascend the trees nearest them in the summer, they, like the winter moths, must be prevented from mounting apple trees, so that it would be expedient to have proper permanent guards fixed round the trunks. In America, Canada, and Tasmania old manure or oil-cake bags, or hay bands, are regularly fastened tightly round apple trees to stop the caterpillars from wriggling up, and they are examined from time to time and the caterpillars dislodged and killed.

Another source of great and often unsuspected harm is the Apple Scale (*Mytilaspis pomorum*). This insect is frequently found in numbers upon the trees, sucking up their juices, weakening them, and making them sickly and liable to other affections. Infested trees should be sprayed with kerosene emulsion as above described.

It has been already mentioned that the branches, twigs, and stems of apple trees are covered with lichens and mosses, concerning which there is usually much indifference, no systematic attempts being made to remove them, although they serve as harbours of refuge for all kinds of insects and in other ways harm the trees. Though such growths may not be parasitic in the technical meaning of this term, they at least keep light, air, and sunshine from the branches and twigs by the thick coverings they form upon them, and they absorb the moisture. The rhizoids or root hairs of lichens permeate the rind, but do not penetrate the living tissues, according to De Bary, Frank, and other authorities. Dr. Lindau in his recent work* states that the hyphæ of the lichens penetrate the corky layer of bark and absorb the cellulose, thereby being directly parasitic and injurious. He holds that this faculty belongs to the higher lichens, especially to species of *Evernia*, *Arthonia*, *Parmelia*, and others found upon apple, filbert, and other trees, and that they are decidedly prejudicial to their proper growth and health. Mosses found usually upon apple trees are not parasitic; they hurt the trees by excluding air, light and especially sunshine from the young ripening wood; and they serve also as harbours for insects. When they cover wounds upon trees caused by bad pruning or other careless operations, they retain moisture, causing decay and encouraging the growth of fungi. These mosses and lichens must be removed by throwing hot, very finely-powdered lime over the trees in damp weather, in the winter, or by spraying the trees thoroughly in winter or very early spring with Bordeaux mixture made with 15 lbs. of sulphate of copper and 10 lbs. of lime to 100 gallons of water. The trunks and large branches may be daubed over with a still

* Lichenologische Untersuchungen. Von Dr. Gustav Lindau, Dresden, 1895.

stronger Bordeaux mixture with whitewash brushes. Sulphate of iron at the rate of 100 lbs. to 100 gallons of water will also kill lichenous and mossy growths.

There are several species of fungi that cause great harm to apple trees, and, being in many instances unnoticed and unsuspected, they continue the work of destruction without let or hindrance. At first they find suitable *nidi*, or resting-places, in wounds caused by bad or injurious treatment, or by the effects of frost, or upon trees whose vitality has been lowered by ignorant or careless cultivation. The fungi are conveyed from tree to tree and from branch to branch by innumerable microscopic spores, wafted by air currents, or carried by insects—notably the woolly aphis and the common apple aphis. These fungi in time engender decay and rottenness on the trunks and branches, and even on the twigs, especially the fungus termed *Nectria ditissima*, known commonly as “canker,” whose injuries are incalculable. A full description of this fungus is given in the “Journal of the Board of Agriculture” for December, 1895, where it is shown that the perithecia, or spore-bearing cases, of the fungus appear as minute brilliant red dots, from which mycelia, or branching centres, are produced and penetrate the rind and wood, drying-up and destroying its juicy tissues. Distortions are caused to the surrounding parts, and decay occurs all round these mycelial centres. When these tiny red spore-cases are noticed, and they can be just discerned without a pocket-lens, all the infected branches should be sprayed when the leaves are off with a strong solution made by mixing 15 lbs. of sulphate of copper with 100 gallons of water. The sulphate of copper must be thoroughly dissolved, and every part of the infected branch or tree must be thoroughly soaked with spray. A *bouillie bordelaise* composed of 15 lbs. of sulphate of copper and 10 lbs. of lime to 100 gallons of water may also be used for this purpose. Sulphate of iron dissolved in warm water, applied in the proportion of 1 lb. to 1 gallon of water, is also effective if every part of the infected branches or limbs is saturated. This must be put on when the leaves have fallen. Young trees should be closely inspected, and if signs of canker

are noted upon them they should not be planted, nor should grafts be taken from trees with the least indications of canker. Infected branches should be at once cut away from trees and burnt.

Another fungus, termed *Dematophora necatrix*, lives upon the roots of apple trees and many other fruit-trees. Young trees upon which the long white filaments of this fungus are discovered should be rejected before they are planted. It is not uncommon for this fungus to become established in nurseries, and as it has the power of sending out its filaments from root to root through the intervening earth, it is most difficult to eradicate. It is called "blanc des racines," or "pourridié," in France, and is very injurious in apple orchards, as shown by M. Crié,* who says that it is due to the persistent planting of cankered trees, or those upon whose roots the mycelia of the *Dematophora* flourish. The fungus *Fusicladium dendriticum* appears on the leaves in the form of black spots, with a greenish tinge, which gradually cover the whole surface of the leaf and kill it. Similar spots appear on the young apples, producing "scab," disfiguring the fruit, and hindering its proper development. When this is seen the trees should be sprayed with *bouillie bordelaise*, composed of from 6 to 8 lbs. of sulphate of copper and 3 to 4 lbs. of lime to 100 gallons of water, when the apples are formed. This should be repeated a week or so later, but it must not be done when the apples have attained to a large size. The spores of this fungus, or the sclerotia, as some affirm, pass the winter on the bark and rind of the stems and twigs; therefore winter spraying with strong sulphate of copper solutions would be of benefit in respect of this as well as other fungi. Ripe rot (*Gleosporium fructigenum*, Berkeley), which attacks ripening apples, would also be checked by spraying with sulphate of copper solutions as recommended for *Fusicladium dendriticum*, and all apples that fall from affected trees must be picked up and buried deeply or burned.

Another disorder that is frequent in apple orchards, especially in those that have been neglected and

* Rapport sur le dépérissement des Pommiers. By M. L. Crié.

maltreated by unskilful pruning and hacking, has only been recently attributed to a bacterio-fungoid form designated as *Micrococcus dendroorthos*, or brown slime-flux, belonging to the Schizomycetes or Fission fungi. Its presence may be detected on the trees by quantities of viscous brown fluid being exuded, generally from wounds, and running down the bark in streams. This flux, or slime-flux, is caused by the action of the fission fungus named, and if neglected probably kills the trees. M. Cri , in his already cited report, attributes much of the decaying condition of apple trees in French orchards to this cause, although, as he states, much has yet to be ascertained as to the life history and action of this dangerous fungus.

On going into an apple orchard, growths of a mushroom, or rather "toadstool," character are plainly seen upon some of the oldest and unhealthiest trees, and frequently near the slime-flux, as if this afforded favourable conditions for such growths, which belong to the *Polypore *, true parasites, able to kill living cells at one time of their existence, and saprophytes at another period. These growths, species of *Polyporus* and *Agaricus*, are able to penetrate even to the heart-wood of trees and destroy them. Some of them are so large that they can be easily seen, and should be cut out or taken off by scrapers, rubbed off repeatedly and checked in their spore stages, or killed by washing with sulphate of copper solutions. Tar may also be worked into the wounds which harbour these fungi.

There are other fungi and fission fungi of less importance injurious to apple trees, of which there is not space to treat. The careful cutting away of infected parts, and regular and judicious spraying, will successfully combat these fungoid disorders, while the selection of sound stocks, the burning of infected branches, leaves, and fruits, and the avoidance of all unnecessary wounds will materially prevent their appearance.

IMPORTS OF THE CEREAL YEAR.

The statement on the opposite page, which has been compiled from the Accounts of Trade and Navigation, shows the quantities and values of the principal articles of agricultural produce imported into the United Kingdom during the cereal year ended August 31st last, and of the imports of a similar character in the corresponding period of 1896-97. The chief differences presented by a comparison of the figures for the two periods may be briefly reviewed under the divisions of meat, grain, and dairy produce.

In the case of meat no noteworthy change is recorded in the entries of live cattle and sheep in the past cereal year compared with those of the preceding twelve months. There was, however, an increase of 286,000 cwts. in the supplies of fresh beef and of 203,000 cwts. in those of fresh mutton. The augmented imports of the former article were mainly due to heavier shipments from the United States, our principal purveyor of imported beef, while the larger receipts of mutton were, for the most part, accounted for by increased consignments from Argentina, whence we imported 1,023,000 cwts. as compared with 845,000 in 1896-97; the entries of mutton from Australasia remained practically at the same level in the two periods, viz., 1,980,000 cwts. Fresh pork is a more prominent item in the trade accounts of the past season owing to the increasing shipments of this article from the United States. To the latter country we are also chiefly indebted for the increase of 750,000 cwts. in the supplies of bacon and hams.

The figures relating to the imports of grain show a slight increase in the imports of wheat, the quantity of this cereal, in the form of grain and flour, imported during the past year having been equivalent to 21,962,000 quarters, as

compared with 21,660,000 quarters in 1896-97 and 22,509,000 quarters in 1895-96. Of the total importation of wheat in 1897-98, two-thirds was contributed by the United States, whence we received consignments of grain and flour representing over 14,000,000 quarters, or, roughly,

ARTICLES.	1ST SEPT. 1896 TO 31ST AUG. 1897.		1ST SEPT. 1897 TO 31ST AUG. 1898.	
	Quantities.	Values.	Quantities.	Values.
		£		£
Horses - - - No.	46,190	1,160,559	46,730	1,226,571
Cattle - - - "	596,057	10,031,243	590,873	9,882,362
Sheep - - - "	695,943	1,021,421	637,957	948,520
Bacon - - - cwts.	4,931,846	8,612,983	5,468,529	9,902,408
Hams - - - "	1,640,642	3,577,522	1,857,520	3,717,177
Beef:				
Salted - - - "	203,212	245,280	178,013	230,461
Fresh - - - "	2,875,486	5,552,424	3,162,070	6,098,844
Meat unenumerated:				
Salted or fresh - "	330,225	656,693	415,287	823,687
Preserved, otherwise than by salting - "	705,212	1,777,627	543,144	1,600,043
Mutton, fresh - - "	3,083,063	4,687,118	3,286,542	4,910,719
Pork:				
Salted (not Hams) - "	249,917	272,294	255,902	288,540
Fresh - - - "	353,854	795,935	449,251	960,763
Rabbits - - - "	237,943	492,200	267,712	528,250
Corn:				
Wheat - - - "	65,017,490	22,475,628	66,387,590	28,168,148
Wheat Meal and flour - "	20,023,305	9,537,371	19,969,580	11,405,364
Barley - - - "	21,696,370	5,454,167	20,257,729	5,427,815
Oats - - - "	18,382,610	4,575,620	15,384,190	4,263,264
Maize - - - "	59,726,120	10,113,417	55,641,692	10,751,513
Butter - - - "	3,188,918	15,940,599	3,200,843	15,883,636
Margarine - - - "	956,881	2,555,163	903,683	2,381,055
Cheese - - - "	2,449,543	5,596,043	2,421,937	5,259,791
Milk, con. or pres. - "	709,124	1,334,015	794,777	1,416,259
" and cream, fresh - "	—	9,696	—	9,013
Eggs - - - gt. hundreds	13,954,024	4,310,599	13,789,128	4,276,740
Fruit:				
Apples - - - bushels	7,178,789	1,834,527	2,961,781	938,030
Pears - - - "	761,349	285,474	630,991	241,096
Hops - - - cwts.	160,887	508,334	228,978	825,474
Onions - - - bushels	6,379,321	778,090	5,816,590	758,665
Potatoes - - - cwts.	2,332,682	926,070	8,087,881	2,142,449
Tallow and Stearine - "	1,821,145	1,778,029	1,991,663	1,978,185
Wool - - - lbs.	743,098,296	24,914,888	691,910,328	23,438,876
Hides, wet and dry - cwts.	1,161,896	2,670,028	1,287,759	3,013,469
Lard - - - "	1,684,222	1,899,180	2,015,439	2,669,187
Poultry and Game - "	—	611,637	—	714,898
Vegetables (unenumerated)	—	1,444,658	—	1,493,267

2,000,000 quarters in excess of the receipts from the same source in the preceding year. The Indian shipments to this country, which were insignificant in 1896-97 in consequence of the famine, amounted to 1,864,000 quarters, this being the largest annual quantity shipped since 1891-92.

Argentina furnished 933,000 quarters, or more than treble her contribution of the previous year. Eastern Europe, on the other hand, is credited with only 2,497,000 quarters, as against 5,234,000 quarters in the preceding twelve months; for this decline Russia is responsible to the extent of 1,300,000 quarters, while smaller consignments from Roumania and Turkey account for the remaining deficiency of 1,400,000 quarters. Another feature of the grain import accounts of the year just closed is the diminution in the supply of oats and maize, the decrease shown in each case being roughly equivalent to 1,000,000 quarters. In the case of oats the contraction was due to a great reduction of Russian shipments, which larger supplies from the United States failed to counter-balance. Russia was formerly our principal purveyor of this cereal, but during the past year she has ranked second, the United States occupying the premier position. The drop in the imports of maize is accounted for by considerably reduced consignments from Argentina.

A comparison of the entries of butter, cheese, and margarine in the two years included in the above table exhibits few changes of any importance; but the receipts of condensed and preserved milk in 1897-98 exceeded those of the previous year by about 86,000 cwts. Denmark maintained her position as the largest exporter of butter to the United Kingdom, the quantity entered to her credit in the trade accounts of the past cereal year being 1,427,000 cwts., out of a total importation of 3,201,000 cwts. In the previous twelve months her consignments to this country amounted in the aggregate to 1,301,000 cwts. The other principal contributors to our supply of butter in 1897-98 were France, 456,000 cwts.; Sweden, 304,000 cwts.; Holland, 270,000 cwts.; Australasia, 229,000 cwts., and Canada, 126,000 cwts. Over sixty per cent. of the cheese imported was of Canadian origin, the supply received from the Dominion in the past year being 1,479,000 cwts., an increase of nearly 85,000 cwts. over the receipts from the same source in 1896-97. The entries of this article from the United States and the Netherlands amounted to 538,000 cwts. and 279,000 cwts. respectively. The last named country also furnished more than ninety per cent. of the imports of margarine.

Among other articles which were imported in larger quantities in the past cereal year than in 1896-97 were rabbits, hops, potatoes, tallow and stearine, and lard. The increase shown in the case of potatoes is remarkable, the total importation in the twelve months ended August last being the largest annual entry recorded for the past twenty years. To this large supply Germany contributed 2,268,000 cwts., as compared with only 11,800 cwts. in the previous year; France furnished 1,633,000 cwts., against 942,000 cwts. credited to her in 1896-97; the Channel Islands sent 1,196,000 cwts.; and the consignments from other countries, not distinguished, amounted to 2,992,000 cwts., or 2,664,000 cwts. in excess of the undistinguished receipts of the preceding twelve months.

Articles showing decreases are eggs, apples, pears, onions, and wool.

THE ESSENTIAL QUALITIES OF GOOD CIDER.

The report recently issued by the Board of Agriculture upon the Distribution of Grants for Agricultural Education contains an account of some investigations in the manufacture of cider carried out at Butleigh by Mr. F. J. Lloyd, F.I.C., F.C.S., on behalf of the Bath and West of England Society, and the following observations on some of the results have been summarised from Mr. Lloyd's notes.

The essential conditions of good cider in the order of merit or importance are enumerated thus—first, flavour; secondly, good appearance, which includes both colour and clearness; and lastly, keeping quality. How to obtain these conditions has been the object of the experiments at Butleigh.

To obtain flavour it is well known that two conditions must be observed. First, the introduction into the juice of any substance which would impart an unpleasant flavour thereto must be prevented. If perfect purity of the juice could be insured, then it becomes evident that the flavour of the resulting cider would depend either upon the original flavour of the apples or apple-juice, or upon changes which took place during fermentation. The flavour doubtless depends to a certain extent upon the original flavour of the apples, for if cider is made from one variety of apple only, and if this has a special, distinct, and marked taste of its own, such, for example, as the Foxwhelp, this flavour of the apple will be present in the resulting cider. Evidently, then, the flavour of other varieties of apples which may not be so marked must still contribute to the flavour of the resulting cider. These flavouring compounds form an infinitely small part of the original juice, and their true flavour only becomes marked when all the sugar has been converted into alcohol.

Even then they are to a certain extent masked by the acid present in the juice, but when both acid and sugar are present they are considerably hidden.

On the other hand, a small percentage of sugar and of acid appear to enhance the good flavour. This is the reason why cider makers are anxious to leave in the cider a certain amount of sugar. The tannin will also affect the flavour. Now, as the amount of sugar, acid, and tannin vary in every sample of cider, it is evident that uniformity cannot be easily obtained in a bulk of liquid, unless some means exist for blending the juice either before or after fermentation. From experiments on a small scale which have been made at Butleigh in the past, it has been evident that, as a rule, blending the juice improves the quality. In 1897 blending was carried out on a larger scale, and the results have thus far proved to be distinctly favourable. Another factor which plays an important part in the production of flavour in cider is the nature of the fermentation. This has been proved by the experiments on pure yeast. Experiments were started with five varieties of pure yeast. Sample bottles of the cider so made were put aside; and, on the 20th December, 1897, one year after bottling, these were tasted. The results showed that to some extent the flavour varied according to the character of the pure yeast employed. That made with yeast obtained from grapes had a distinctly vinous flavour. That made with yeast originally taken from the Kingston Black apple had a slight flavour of the Kingston Black, but only very slight. That made with the pure cider yeast had more of the flavour of cider, or perhaps it would be better to say, did not bring into the mind the idea of any flavour other than that of cider. But, in spite of these slight differences, there was an undoubted similarity between all these samples, and this was attributed to the flavour of the original apple-juice.

As regards the flavour of small cider, it is noteworthy that, in the opinion of a great number of those who tasted the cider made at Butleigh in 1896, the small cider was preferred to the cider produced by the fermentation of the whole juice. After a careful study of all the facts, it seems reason-

able to conclude that the flavour of cider very largely depends upon the non-fermentable substances present in the juice ; and that if these are in excess, they will so cover the flavour due to fermentation as to materially lessen the value of the resulting liquid. If this theory is correct, it is evident that by diminishing the quantity of unfermentable material, one should improve the flavour of the resulting cider.

Why is the cider made from early-gathered apples seldom, if ever, so good as that made subsequently? It was in trying to solve this problem that the influence of the non-fermentable constituents first occurred to Mr. Lloyd.

Experiments were started to test this view. Some apple-juice from windfalls was fermented as usual in one barrel, while a portion of similar juice was diluted with one-half its own volume of water—by which the non-fermentable constituents would be greatly reduced—and sufficient sugar was then added to make the liquid contain the same amount of sugar as the whole juice. The result was a better cider from the diluted juice than from the whole juice.

These experiments with early-made cider have been more striking in their results than experiments carried out subsequently with what may be termed ordinary juice, though even in the latter case benefit has sometimes resulted. It is not unlikely that the amount of these non-fermentable constituents depends, partly upon the season, partly upon the variety of apple, and partly upon the care which is taken in the management of the orchard ; but on these points further investigation will be necessary.

It is generally believed that the chief reason why cider has not become a more popular drink has been the difficulty of obtaining it of uniform quality, flavour, and colour. The results recorded at Butleigh seem to point to the desirability of obtaining a “standard” composition for the juice, and of blending or diluting the entire juice, until this standard is obtained. Not until this is done will it be possible to produce a liquid which shall have the same uniformity as is now obtained in the wines of the leading manufacturers in foreign countries.

It has been stated that a certain amount of sugar in cider

enhances the flavour. Probably the most difficult task of the cider-maker is to retain in the juice this small amount of sugar, or, as it is often called, "sweets." Unfortunately the desire to do so has outweighed all other considerations with some makers; and, as often happens with things which are good in moderation, this desire, carried to excess, has produced a greater evil than the one which it was originally intended to counteract. Those who are investigating the manufacture of cider and other fermented liquids are striving to find a natural means to retain the sugar. Failing the discovery of such a means, preservatives are being used by many, often without the least knowledge of their composition or their effect upon the human body. In view of their wide employment experiments have been made to try and determine what actual benefit may accrue from their use, and what quantities must be employed to be effectual. The results of these experiments will be recorded in due course.

The conditions affecting the colour of cider have, it appears, already been investigated in earlier experiments at Butleigh. The colour depends partly upon the natural colour of the apple-juice, partly upon the freedom of this juice from extraneous substances—as, for example, the juice of rotten apples—and partly on the treatment of the pomace after it leaves the mill and before pressing, for if then exposed to the air it gets darker, and the resulting juice is more highly coloured. In the manufacture of cider at Butleigh, precautions are taken to prevent all these sources of high colour. Clearness is more difficult to obtain, especially with cider in bottle. It can be obtained in bottle by disgorging, as is done in the wine industry; but the cost of this process would be prohibitive. It is easy to obtain a dry cider in bottle without much deposit, provided the juice is placed in the bottles immediately it comes from the filter, and is not filtered until nearly the whole of the sugar has been fermented. There is a general opinion that sugar-candy will not ferment if placed in the juice at this time, and experiments have been started to determine how far this assumption is correct. That a certain amount of fermentation should proceed in the bottle

is necessary to give the cider "life," and the difficulty up to the present has been to obtain this "life" without too much deposit. The value of the filter as a first means of obtaining a clear juice has been amply demonstrated at Butleigh.

Lastly, as regards keeping quality, it has been found at Butleigh that if care is taken to obtain the juice free from impurities in the first place; if the fermentation of the juice is carefully watched by means of the saccharometer, and not allowed to proceed too far before filtration takes place; and if subsequently the barrels are kept air-tight, the cider not only keeps well, but improves in quality by keeping. But if the juice is allowed to ferment to dryness before it is filtered, so that no subsequent fermentation takes place to restore life to the cider, it will be far more difficult to keep. All the results up to the present go to show that the juice intended for bottling should be filtered and bottled before the gravity has sunk below 1.020, and that for storing in casks the gravity should not be lower than 1.015.

THE SWALLOW (*Hirundo rustica* Linn.).

This bird is sometimes called the "Chimney" Swallow, sometimes the "Barn" Swallow. Macgillivray says that the former name is not very correct, as the Swallow rarely builds in chimneys. He distinguishes it from the Martin, *Hirundo* (Chelidon) *urbica*, by calling the first the "Red-fronted," and the Martin the "White-rumped."

There is considerable confusion between the Swallow and the Martin, and this is accentuated by the similarity in their habits and their appearance in this country at about the same time. Their modes of flight and their general behaviour, except in the matter of nest-making, are practically identical, while they are both entirely insectivorous and feed upon the same kinds of insects, taking these in the same manner, and frequently flying together in pursuit of them. There are, however, unmistakable differences in the plumage of the two species.

It may be said of the Swallow and the Martin, as well as of the other species of the *Hirundines*, the Sand Martin, *Hirundo riparia*, that they are of more benefit from an economic point of view, as insect destroyers, than any other species of birds. They live solely upon insects, which they catch mainly on the wing, though they may be seen sometimes taking them from the ground. Swallows take flies of all kinds and many species of gnats, small moths, beetles on the wing, and beetles and other insects upon the ground. When the large gnats, species of *Tipulidæ*, *Tipula oleracea* (the Daddy Longlegs), *Tipula Maculosa*, and other "Crane flies," come from the pupal form

towards the end of the summer, and fly heavily over the fields, pastures, and lawns, dropping their eggs in their flight, they are eagerly seized by the swallows, which fly low to secure them. Swallows are also most useful to hop planters in destroying quantities of the hop flies, or aphides (*Phorodon humuli*), as they leave the hop gardens for their winter quarters on the neighbouring plum and damson trees, from which they come again in the early spring and go to the hop plants. The migrations of these insects afford a fine harvest for swallows, but unfortunately the latter are now so reduced in numbers that their influence in keeping down hop flies is much less effective than formerly. It is said by observers that the regular recurrence of hop aphid attacks, known as "blights," year after year, and their alarmingly increasing intensity are due to the absence of swallows. Until within the last fifteen years a serious attack of hop flies only occurred once in three or four years, or even less frequently; but now it is a grievous annual visitation.

The Swallow (*Hirundo rustica*) has its throat and forehead chestnut-coloured, or reddish-brown, with its body of a bluish hue, and its wings and tail brownish; the bill is black and the feet brown, or brownish-black; under the wings, and on the belly, the colour inclines to buff. It is rather more than eight inches from the head to the tail, and its wing expanse is fourteen inches. There is but little difference in the appearance of the sexes; the tail of the female is, however, shorter than that of the male.

This bird appears in this country, as a rule, about the middle of April, and takes its leave towards the end of September or the beginning of October. Its nest is composed of mud or dirt, cow or horse-dung, mixed with bits of straw or dried grass and hair, and is lined with fine grasses and feathers. It is not covered like the Martin's nest, and is placed under the eaves of barns and many other buildings, on the beams and joists of out-houses, under gateways, and beneath the arches of bridges. The eggs, of which four or five are usually laid, are white, speckled with brown or dark



THE SWALLOW (*Hirundo rustica*).



red spots. There are two broods, or there would be if the sparrows did not intervene. The young of the first brood generally fly towards the end of June, and the second at the end of August.

About the second week in September the birds congregate and betake themselves at night to trees to prepare for their long flight to warmer regions—Africa, India, and other countries—where they pass the winter.

The continued decrease in the numbers of Swallows and Martins is a serious loss to agriculture. It seems that there are two reasons for this diminution, one being the slaughter of the birds in the South of Europe, and the other the great increase of the House Sparrow, *Passer domesticus*, which drives away the Swallows from their nesting places, and prevents them from freely breeding. With regard to the first of these reasons there is no doubt that there is a great slaughter of Swallows in the countries through which these birds pass in their migratory passages to and from Great Britain and other of their summer resorts. Dr. Oustalet, the French delegate to the Ornithological Congress at Vienna in 1884, drew attention, in his report, to the deplorable slaughter at that time of Swallows in the South of France. In an interesting report, presented to the Société Zoologique de France in 1888, it is stated that thousands of dead Swallows were consigned to Paris in the spring of 1887 and 1888 for the fashions, *pour les modes*; these had been captured in the Department of the Bouches-du-Rhone by means of hooks, nets, and electric batteries which, it is said, destroy many thousands of victims in a day. The report concluded by praying the Minister of Agriculture and the Minister of the Interior to urge the Prefects of Departments to forbid the slaughter of Swallows. The wanton destruction of these birds was also the subject of complaint at a conference held at Auxerre in 1892 to consider steps to be taken for the preservation of insectivorous birds. It was again referred to in a report upon the Protection of Small Birds, presented by M. A. Duval to a general meeting of the Société des Agriculteurs de France in 1894. In Italy, also,

large numbers of Swallows are destroyed for food and purposes of fashion.*

The other reason for the paucity of Swallows in this country is that they are sorely tormented by the ubiquitous Sparrow, whose numbers have largely increased in late years. The places where Swallows have been accustomed to build are all occupied by Sparrows, whose pugnacity and overbearing spirit will not allow any other birds to come near them.

In the draft proposal for a convention formulated by the International Conference on the protection of birds useful to agriculture, held in Paris in 1895, when Great Britain was represented by Sir Herbert Maxwell and Mr. Howard Saunders, Swallows of all kinds were included in the schedule of birds useful to agriculture, the destruction or capture of which would be entirely prohibited at all times.

The Swallow is not included in the schedule to the Wild Birds Protection Act of 1880; but a special close time has been prescribed for its protection in the counties of Brecon, Buckingham, Durham, Huntingdon, Kent, Lancashire, Leicester, Lincoln Kesteven and Lindsey, London, Middlesex, Stafford, West Suffolk, Wilts, Worcester, and the Isle of Wight. Its eggs are protected in most of the counties already named, and in parts of Cambridgeshire, Cheshire, East Suffolk, Norfolk, Northumberland, Surrey, Yorkshire East Riding, and Orkney.

* Dr. Carl Landsteiner, Provost of Moravia, who made an appeal dated Christmas, 1896, on behalf of harmless and useful birds, spoke of the incredible barbarity of lying in wait for poor birds on their way to the warm south wearied by long flights, and slaughtering them by the million. He stated that in the large cities of Italy, huge piles of nightingales, larks, finches and swallows might be seen on the stalls of the markets.

AGRICULTURAL RETURNS OF GREAT BRITAIN, 1898.

PRELIMINARY STATEMENT for 1898, compiled from the Returns collected on the 4th June ; and comparisons with previous Years.

CROPS AND LIVE STOCK.	1898.	1897.	1896.	1895.
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
Wheat - - - - -	2,102,220	1,889,161	1,693,957	1,417,483
Barley - - - - -	1,903,652	2,035,790	2,104,764	2,166,279
Oats - - - - -	2,917,770	3,036,056	3,095,488	3,296,063
Potatoes - - - - -	524,591	504,914	563,741	541,217
Hay from clover & rotation grasses	2,381,551	2,285,965	2,171,966	2,303,431
Hay from permanent pasture	4,536,425	4,509,785	4,637,923	4,760,074
Hops - - - - -	49,735	50,863	54,217	58,940
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
Cows & Heifers in Milk or in Calf	2,587,190	2,532,379	2,511,675	2,485,820
Other Cattle :—2 Years and above	1,381,595	1,323,230	1,365,057	1,431,525
„ 1 Year and under 2	1,345,844	1,360,741	1,306,313	1,190,368
„ Under 1 Year	1,307,735	1,284,147	1,310,537	1,246,623
TOTAL OF CATTLE - -	6,622,364	6,500,497	6,493,582	6,354,336
Ewes kept for Breeding - -	10,137,932	10,006,697	9,925,587	9,663,129
Other Sheep :—1 Year and above	6,203,858	6,219,001	6,427,982	6,334,386
„ Under 1 Year -	10,401,404	10,114,742	10,351,760	9,794,680
TOTAL OF SHEEP - -	26,743,194	26,340,440	26,705,329	25,792,195
Sows kept for Breeding - -	362,200	334,244	393,729	415,210
Other Pigs - - - - -	2,089,395	2,008,058	2,485,072	2,469,221
TOTAL OF PIGS - - -	2,451,595	2,342,302	2,878,801	2,884,431

COMPARISONS with 1897 and 1896.

CROPS AND LIVE STOCK.	1898 compared with 1897.				1898 compared with 1896.			
	Increase.		Decrease.		Increase.		Decrease.	
	<i>Acres.</i>	<i>Per Cent.</i>	<i>Acres.</i>	<i>Per Cent.</i>	<i>Acres.</i>	<i>Per Cent.</i>	<i>Acres.</i>	<i>Per Cent.</i>
Wheat - - - - -	213,059	11'3	...	...	408,263	24'1	...	...
Barley - - - - -	...	...	132,138	6'5	...	...	201,112	9'6
Oats - - - - -	...	...	118,286	3'9	...	...	177,718	5'7
Potatoes - - - - -	19,677	3'9	...	...	...	...	39,150	6'9
Hay from clover - -	95,586	4'2	...	...	209,585	9'6	...	...
Hay from pasture -	26,640	0'6	...	...	...	...	101,498	2'2
Hops - - - - -	...	...	1,128	2'2	...	...	4,482	8'3
	<i>No.</i>	<i>Per Cent.</i>	<i>No.</i>	<i>Per Cent.</i>	<i>No.</i>	<i>Per Cent.</i>	<i>No.</i>	<i>Per Cent.</i>
Cows - - - - -	54,811	2'2	...	...	75,515	3'0	...	...
Other Cattle, 2 & above	58,365	4'4	...	...	16,538	1'2	...	...
„ 1 & under 2	...	...	14,897	1'1	39,531	3'0	...	...
„ Under 1	23,588	1'8	...	...	...	...	2,802	0'2
TOTAL CATTLE - -	121,867	1'9	...	...	128,782	2'0	...	...
Ewes - - - - -	131,235	1'3	...	...	212,345	2'1	...	...
Other Sheep, 1 & above	...	...	15,143	0'2	...	...	224,124	3'5
„ Under 1 -	286,662	2'8	...	...	49,644	0'5	...	...
TOTAL SHEEP - -	402,754	1'5	...	...	37,865	0'1	...	...
Sows - - - - -	27,956	8'4	...	...	...	...	31,529	8'0
Other Pigs - - - - -	81,337	4'1	...	...	...	...	395,677	15'9
TOTAL PIGS - - -	109,293	4'7	...	...	...	...	427,206	14'8

II.—COUNTY SUMMARY

PRELIMINARY STATEMENT of the ACREAGE under WHEAT,
compiled from the Returns collected on the 4th June,

COUNTIES.	Wheat.		Barley.		Oats.	
	1898.	1897.	1898.	1897.	1898.	1897.
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
TOTAL FOR GREAT BRITAIN }	2,102,220	1,889,161	1,903,652	2,035,790	2,917,770	3,036,056
ENGLAND - - -	1,987,385	1,785,562	1,562,761	1,698,323	1,731,167	1,829,072
WALES - - -	58,960	53,810	102,921	104,371	230,670	238,510
SCOTLAND - - -	55,875	49,789	237,970	233,096	955,933	968,474
ENGLAND.						
BEDFORD - - -	42,145	37,898	19,063	21,887	14,955	15,963
BERKS - - -	40,150	38,610	25,293	26,777	29,406	30,484
BUCKINGHAM - - -	37,199	35,822	17,454	19,585	26,808	28,402
CAMBRIDGE - - -	102,955	95,144	52,973	58,893	42,742	43,948
CHESTER - - -	17,950	13,533	1,387	1,930	60,070	61,940
CORNWALL - - -	31,621	27,435	29,771	31,278	64,789	65,006
CUMBERLAND - - -	4,223	3,800	2,136	1,953	75,376	77,118
DERBY - - -	16,579	13,844	5,541	6,698	24,260	26,664
DEVON - - -	71,156	65,476	39,947	44,123	117,600	122,169
DORSET - - -	26,611	24,264	25,856	26,951	26,427	27,414
DURHAM - - -	17,781	12,523	15,053	16,316	32,151	36,173
ESSEX - - -	124,861	115,412	84,767	94,279	50,571	55,740
GLOUCESTER - - -	55,084	52,990	24,606	28,138	30,855	32,723
HANTS - - -	67,079	64,735	37,019	40,668	72,634	73,216
HEREFORD - - -	31,833	29,197	18,530	20,373	21,334	23,064
HERTFORD - - -	54,152	52,359	27,529	31,803	32,132	33,948
HUNTINGDON - - -	33,729	30,494	19,523	21,866	11,341	11,554
KENT - - -	53,494	47,427	36,535	39,502	43,804	47,738
LANCASTER - - -	22,146	17,912	6,389	8,827	70,812	73,802
LEICESTER - - -	25,562	21,472	12,510	15,502	25,070	25,955
LINCOLN - - -	207,425	174,424	194,802	220,128	114,777	122,345
LONDON - - -	210	124	43	47	158	182
MIDDLESEX - - -	3,643	3,547	1,013	1,122	2,454	2,756
MONMOUTH - - -	8,168	7,461	4,745	5,278	8,507	8,925
NORFOLK - - -	144,133	134,095	197,360	203,849	49,690	51,296
NORTHAMPTON - - -	49,840	43,698	41,891	46,972	22,245	23,381
NORTHUMBERLAND - - -	9,688	6,543	32,028	33,804	44,116	46,801
NOTTS - - -	43,824	36,500	35,518	40,458	31,591	33,001
OXFORD - - -	40,995	38,902	39,496	42,607	28,018	30,709
RUTLAND - - -	5,425	4,330	10,494	11,121	3,634	3,744
SALOP - - -	42,395	38,552	49,370	50,439	37,904	41,304
SOMERSET - - -	39,317	36,708	22,989	25,656	25,597	27,847
STAFFORD - - -	25,581	23,664	15,300	16,010	36,371	38,883
SUFFOLK - - -	116,986	105,839	138,504	143,655	30,822	35,176
SURREY - - -	22,812	20,254	7,497	8,627	22,116	23,490
SUSSEX - - -	57,747	54,397	10,899	12,319	58,504	61,692
WARWICK - - -	39,835	36,648	12,483	14,629	27,405	29,447
WESTMORLAND - - -	225	168	633	792	16,163	16,505
WILTS - - -	57,682	56,569	38,447	40,464	43,331	44,256
WORCESTER - - -	35,418	34,747	9,260	10,677	16,472	18,389
YORK, N. RIDING - - -	69,144	58,194	72,737	77,286	93,053	98,282
„ N. RIDING - - -	34,034	22,229	70,264	76,964	72,043	78,352
„ W. RIDING - - -	56,548	47,622	55,106	58,070	73,059	79,288

—ACREAGE.

BARLEY, and OATS in the several COUNTIES of GREAT BRITAIN, 1898, with a COMPARATIVE STATEMENT for 1897.

COUNTIES (Continued).	Wheat.		Barley.		Oats.	
	1898.	1897.	1898.	1897.	1898.	1897.
WALES.	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
ANGLESEY - - -	209	330	1,721	1,732	22,250	21,708
BRECON - - -	3,979	3,704	4,584	4,649	13,440	13,976
CARDIGAN - - -	6,430	5,805	15,567	15,482	29,514	30,905
CARMARTHEN - - -	8,803	8,258	13,837	13,352	32,568	34,297
CARNARVON - - -	450	424	5,970	6,163	11,437	11,679
DENBIGH - - -	7,390	6,128	14,383	14,829	26,621	27,526
FLINT - - -	5,592	4,710	5,415	5,563	11,942	12,613
GLAMORGAN - - -	6,308	5,981	7,106	7,673	11,892	12,946
MERIONETH - - -	867	863	4,135	4,099	9,880	10,046
MONTGOMERY - - -	12,013	10,952	8,336	8,359	21,796	22,800
PEMBROKE - - -	3,475	3,370	18,460	19,015	27,160	27,507
RADNOR - - -	3,444	3,285	3,407	3,455	12,161	12,507
SCOTLAND.						
ABERDEEN - - -	35	5	32,928	29,353	181,546	184,482
ARGVILL - - -	...	...	1,578	1,685	17,847	17,951
AYR - - -	1,992	1,928	1,401	1,402	44,851	45,554
BANFF - - -	7	12	11,725	10,965	45,714	45,980
BERWICK - - -	3,214	2,206	19,632	20,065	33,441	34,286
BUTE - - -	25	18	141	90	4,972	5,239
CAITHNESS - - -	...	5	1,105	1,010	34,138	33,840
CLACKMANNAN - - -	355	366	428	359	3,064	3,298
DUMBARTON - - -	1,123	1,032	210	223	6,896	7,047
DUMFRIES - - -	137	130	783	630	43,937	44,526
EDINBURGH - - -	5,053	4,498	4,739	5,040	23,241	23,457
ELGIN or MORAY - - -	1,315	831	15,194	14,896	19,645	19,993
FIFE - - -	10,450	9,860	21,341	21,863	39,044	39,585
FORFAR - - -	8,439	7,938	29,549	29,413	47,836	48,981
HADDINGTON - - -	6,349	5,773	14,714	14,926	17,403	18,237
INVERNESS - - -	60	30	7,695	7,333	29,850	30,266
KINCARDINE - - -	526	445	13,925	13,070	27,703	28,637
KINROSS - - -	34	12	421	435	6,366	6,242
KIRCUDBRIGHT - - -	107	95	78	62	27,536	27,543
LANARK - - -	2,567	2,260	350	377	37,691	37,987
LINLITHGOW - - -	1,527	1,392	3,035	3,172	9,740	9,766
NAIRN - - -	27	12	3,607	3,609	5,315	5,530
ORKNEY - - -	...	...	4,711	4,616	33,479	33,445
PEEBLES - - -	13	13	381	315	8,174	8,071
PERTH - - -	6,096	5,404	14,672	14,380	63,985	65,079
RENFREW - - -	1,879	1,788	131	135	11,330	11,688
ROSS and CROMARTY - - -	1,090	694	13,200	12,977	29,510	29,864
ROXBURGH - - -	779	510	12,379	12,667	29,540	29,288
SELKIRK - - -	7	5	480	367	5,050	4,914
SHETLAND - - -	...	...	1,982	2,002	7,387	7,312
STIRLING - - -	2,109	2,013	3,093	3,319	18,296	18,423
SUTHERLAND - - -	...	...	1,476	1,365	7,887	7,920
WIGTOWN - - -	560	514	886	975	33,519	34,043

II.—COUNTY SUMMARY.

PRELIMINARY STATEMENT of the ACREAGE under POTATOES
from the Returns collected on the 4th June, 1898,

COUNTIES.	Potatoes.		Hay FROM CLOVER AND ROTATION GRASSES.		Hay FROM PERMANENT PASTURE.	
	1898.	1897.	1898.	1897.	1898.	1897.
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
TOTAL FOR GREAT BRITAIN }	524,591	504,914	2,381,551	2,285,965	4,536,425	4,509,785
ENGLAND - - -	365,432	352,365	1,779,341	1,692,612	3,932,330	3,901,563
WALES - - -	32,797	32,609	199,959	196,251	474,492	473,725
SCOTLAND - - -	126,362	119,940	402,251	397,102	129,603	134,497
ENGLAND.						
BEDFORD - - -	7,623	7,118	20,334	16,557	32,109	33,046
BERKS - - -	2,012	1,898	38,229	35,442	73,891	72,016
BUCKINGHAM - - -	1,538	1,488	28,995	27,000	92,815	92,066
CAMBRIDGE - - -	19,849	19,847	38,449	35,346	39,198	40,319
CHESTER - - -	24,773	23,252	60,779	60,363	93,760	93,151
CORNWALL - - -	5,337	5,376	52,737	49,214	32,807	32,817
CUMBERLAND - - -	9,080	8,358	42,544	44,025	70,784	69,679
DERBY - - -	2,489	2,391	19,932	20,552	132,497	132,971
DEVON - - -	12,547	11,856	83,086	74,014	112,856	114,146
DORSET - - -	1,829	1,719	32,067	31,073	93,570	92,930
DURHAM - - -	8,621	7,650	41,675	41,659	92,292	91,459
ESSEX - - -	9,981	9,905	73,443	70,621	106,361	109,403
GLOUCESTER - - -	4,158	4,079	59,086	52,956	153,848	154,436
HANTS - - -	6,120	5,976	90,848	86,802	92,938	90,402
HEREFORD - - -	1,909	1,835	24,799	24,517	80,743	76,546
HERTFORD - - -	3,921	3,566	39,154	35,940	57,307	57,952
HUNTINGDON - - -	7,872	7,708	13,204	12,331	24,787	25,321
KENT - - -	13,276	13,067	42,531	40,813	109,751	105,787
LANCASTER - - -	38,308	37,053	75,774	74,749	197,104	197,873
LEICESTER - - -	2,186	2,071	20,130	19,703	95,173	92,975
LINCOLN - - -	51,881	50,197	98,975	92,151	96,779	97,410
LONDON - - -	456	451	154	208	3,790	3,953
MIDDLESEX - - -	2,799	2,695	2,005	1,765	47,927	49,623
MONMOUTH - - -	1,514	1,422	12,061	11,512	67,333	67,232
NORFOLK - - -	8,243	8,318	137,697	133,850	52,363	53,761
NORTHAMPTON - - -	3,102	2,806	26,311	26,539	83,325	79,725
NORTHUMBERLAND - - -	4,499	4,122	43,081	45,192	70,475	69,743
NOTTS - - -	7,727	7,345	28,679	28,228	67,182	63,740
OXFORD - - -	2,495	2,452	42,345	35,880	75,950	72,784
RUTLAND - - -	150	159	3,392	3,265	11,722	11,525
SALOP - - -	6,761	6,263	47,961	40,607	102,279	100,155
SOMERSET - - -	5,034	4,737	32,127	29,403	236,729	242,169
STAFFORD - - -	10,455	9,631	35,429	33,467	124,363	124,612
SUFFOLK - - -	2,504	2,441	73,548	68,443	64,619	65,096
SURREY - - -	6,021	5,937	20,215	20,138	74,171	73,238
SUSSEX - - -	3,270	3,422	47,554	45,468	135,925	129,338
WARWICK - - -	5,973	6,154	29,085	27,093	100,696	99,211
WESTMORLAND - - -	1,432	1,318	7,205	7,892	53,383	52,852
WILTS - - -	2,782	2,640	61,613	59,024	146,655	145,948
WORCESTER - - -	7,199	7,715	19,949	17,306	92,061	90,917
YORK, E. RIDING - - -	12,236	11,985	22,242	21,413	38,617	37,249
" N. RIDING - - -	11,790	10,790	40,301	37,860	137,577	135,988
" W. RIDING - - -	23,680	23,152	49,556	46,231	263,818	259,999

—ACREAGE.

and HAY in the several COUNTIES of GREAT BRITAIN, compiled with a COMPARATIVE STATEMENT for 1897.

COUNTIES (Continued).	Potatoes.		Hay FROM CLOVER AND ROTATION GRASSES.		Hay FROM PERMANENT PASTURE.	
	1898.	1897.	1898.	1897.	1898.	1897.
WALES.						
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
ANGLESEY - - -	2,815	2,704	21,146	20,194	13,893	13,450
BRECON - - -	1,081	1,090	8,040	8,029	36,797	37,263
CARDIGAN - - -	5,989	5,936	21,537	20,635	37,236	36,432
CARMARTHEN - -	3,713	3,677	18,700	18,338	77,576	77,388
CARNARVON - - -	4,322	4,406	19,859	20,674	38,098	39,726
DENBIGH - - -	3,257	3,207	25,406	25,247	33,370	32,165
FLINT - - -	2,328	2,260	14,161	14,002	18,365	17,227
GLAMORGAN - - -	1,948	1,914	15,876	16,412	70,954	71,231
MERIONETH - - -	1,854	1,859	9,029	8,379	35,947	36,174
MONTGOMERY - -	2,077	2,143	18,313	17,863	45,836	45,985
PEMBROKE - - -	2,528	2,503	20,060	18,815	42,491	42,498
RADNOR - - -	885	910	7,832	7,663	23,929	24,186
SCOTLAND.						
ABERDEEN - - -	7,322	7,073	46,159	44,786	1,023	1,443
ARGYLL - - -	4,759	4,727	11,235	11,312	13,285	12,721
AYR - - -	7,297	7,158	31,701	29,903	16,132	17,715
BANFF - - -	1,969	1,958	9,413	9,139	765	1,209
BERWICK - - -	2,413	2,271	9,563	9,091	1,307	2,281
BUTE - - -	961	949	2,186	2,161	430	364
CAITHNESS - - -	1,633	1,623	9,243	8,766	1,593	1,416
CLACKMANNAN - -	327	266	1,779	1,623	600	519
DUMBARTON - - -	2,308	2,149	6,885	6,728	1,805	1,906
DUMFRIES - - -	3,523	3,391	17,877	18,275	18,255	18,175
EDINBURGH - - -	5,125	4,542	13,049	13,084	1,839	2,029
ELGIN, or MORAY	1,709	1,641	5,348	5,680	490	1,278
FIFE - - -	14,264	13,326	27,179	27,999	4,474	4,856
FORFAR - - -	11,965	11,429	19,686	20,088	1,944	1,952
HADDINGTON - - -	7,686	7,205	10,517	10,766	924	871
INVERNESS - - -	5,927	5,744	11,518	11,196	5,114	5,120
KINCARDINE - - -	2,372	2,190	12,659	12,475	190	111
KINROSS - - -	588	517	2,623	2,665	850	759
KIRKCUDBRIGHT -	1,481	1,436	8,977	8,983	12,482	12,134
LANARK - - -	4,163	3,573	35,645	34,641	8,614	8,976
LINLITHGOW - - -	1,636	1,411	7,338	7,066	776	952
NAIRN - - -	324	327	1,720	1,546	81	252
ORKNEY - - -	2,775	2,749	7,353	7,388	712	538
PEEBLES - - -	369	335	2,053	2,146	1,563	1,727
PERTH - - -	12,385	11,416	29,998	30,637	9,681	9,347
RENFREW - - -	2,946	2,951	14,467	14,116	5,003	5,048
ROSS and CROMARTY	7,523	7,343	14,085	13,792	2,009	1,949
ROXBURGH - - -	1,295	1,249	8,971	9,044	6,235	8,145
SELKIRK - - -	188	203	1,142	1,036	1,406	1,146
SHETLAND - - -	3,121	3,136	751	694	1,519	1,475
STIRLING - - -	2,989	2,696	12,561	12,076	3,542	3,416
SUTHERLAND - - -	1,677	1,628	3,936	4,131	1,259	1,109
WIGTOWN - - -	1,342	1,328	4,634	4,069	3,701	3,558

II.—COUNTY SUMMARY.

PRELIMINARY STATEMENT of the NUMBER of CATTLE, SHEEP,
from the Returns collected on the 4th June,

COUNTIES.	Cattle.		Sheep.		Pigs.	
	1898.	1897.	1898.	1897.	1898.	1897.
	No.	No.	No.	No.	No.	No.
TOTAL FOR GREAT BRITAIN -	6,622,364	6,500,497	26,743,194	26,340,440	2,451,595	2,342,302
ENGLAND - -	4,674,303	4,567,834	15,886,538	15,721,213	2,078,898	1,990,534
WALES - - -	701,777	709,120	3,268,708	3,195,359	238,581	216,447
SCOTLAND - -	1,246,284	1,223,543	7,587,948	7,423,868	134,116	135,321
ENGLAND.						
BEDFORD - - -	32,658	30,641	101,159	99,089	25,387	25,435
BERKS - - -	43,564	41,582	173,918	175,228	25,349	24,590
BUCKINGHAM -	71,786	68,688	197,262	194,654	30,533	29,760
CAMBRIDGE - -	53,436	49,935	209,949	210,400	49,658	49,818
CHESTER - - -	176,256	174,367	94,256	95,073	73,467	66,222
CORNWALL - -	192,585	195,917	406,229	408,281	83,416	76,816
CUMBERLAND -	144,158	143,685	594,113	566,487	21,672	20,513
DERBY - - -	137,835	137,238	172,142	183,227	30,550	29,021
DEVON - - -	266,144	269,057	870,770	860,901	101,470	92,633
DORSET - - -	86,380	83,004	365,310	353,483	57,175	52,413
DURHAM - - -	74,240	72,907	243,431	244,914	13,129	11,122
ESSEX - - -	89,550	83,610	287,641	295,288	84,774	90,559
GLOUCESTER -	117,685	114,968	357,262	347,072	70,347	68,416
HANTS - - -	84,344	81,121	388,706	375,696	68,118	67,329
HEREFORD - -	89,353	87,490	323,366	309,561	25,533	23,294
HERTFORD - -	35,151	33,158	118,040	119,421	24,083	25,976
HUNTINGDON -	30,007	28,673	99,210	100,399	18,332	18,595
KENT - - -	77,937	76,447	937,261	934,698	57,282	57,135
LANCASTER - -	237,151	230,462	332,260	320,209	54,801	53,449
LEICESTER - -	133,656	131,253	329,903	322,890	24,624	24,397
LINCOLN - - -	244,372	239,947	1,203,677	1,167,676	99,249	96,121
LONDON - - -	6,253	6,079	5,437	5,175	2,574	2,939
MIDDLESEX - -	17,096	17,274	19,116	19,024	12,456	13,535
MONMOUTH - -	45,822	45,283	213,238	204,350	16,646	14,585
NORFOLK - - -	138,785	123,760	531,048	517,430	97,745	96,596
NORTHAMPTON -	121,683	118,504	406,877	409,534	28,899	27,590
NORTHUMBERLAND	112,012	106,517	1,074,939	1,049,232	10,848	10,256
NOTTS - - -	81,449	80,627	211,450	220,602	29,388	27,077
OXFORD - - -	57,835	55,861	235,827	232,493	33,389	32,053
RUTLAND - - -	17,924	17,244	84,167	82,183	2,021	2,153
SALOP - - -	167,587	167,217	451,740	451,574	69,377	59,519
SOMERSET - - -	229,722	222,207	538,225	528,534	124,277	119,475
STAFFORD - - -	156,782	153,635	247,907	246,702	52,365	46,164
SUFFOLK - - -	77,081	68,618	404,283	391,027	144,763	146,412
SURREY - - -	43,994	43,297	72,231	79,433	21,461	22,006
SUSSEX - - -	112,679	110,775	436,800	433,695	40,667	40,293
WARWICK - - -	102,536	99,863	274,670	280,724	36,943	36,629
WESTMORLAND -	65,641	65,088	368,727	373,698	4,217	3,999
WILTS - - -	111,568	107,529	513,729	509,944	66,257	67,154
WORCESTER - -	64,282	63,088	169,947	167,583	41,159	40,723
YORK, E. RIDING	88,560	87,485	453,681	450,560	59,105	51,209
„ N. RIDING -	171,099	169,546	704,235	707,872	54,458	46,676
„ W. RIDING -	266,565	264,187	662,399	675,197	90,934	79,877

—LIVE STOCK.

and PIGS in the several COUNTIES of GREAT BRITAIN, compiled 1898, with a COMPARATIVE STATEMENT for 1897.

COUNTIES (Continued).	Cattle.		Sheep.		Pigs.	
	1898.	1897.	1898.	1897.	1898.	1897.
WALES.						
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
ANGLESEY - - -	51,582	51,260	71,748	71,129	17,477	15,499
BRECON - - -	39,014	39,253	485,094	475,868	8,864	8,213
CARDIGAN - - -	65,168	65,773	255,020	253,792	23,383	21,722
CARMARTHEN - -	114,756	115,800	263,217	253,397	38,651	33,570
CARNARVON - - -	53,918	55,729	244,573	256,395	21,470	21,437
DENBIGH - - -	64,979	66,012	315,422	303,676	27,406	25,642
FLINT - - -	34,882	35,062	75,431	72,767	18,434	16,175
GLAMORGAN - - -	52,140	51,668	320,110	304,359	16,634	15,298
MERIONETH - - -	37,584	37,885	418,826	411,570	8,771	7,957
MONTGOMERY - -	69,021	70,766	401,158	389,473	22,678	20,299
PEMBROKE - - -	86,709	88,546	134,500	130,064	29,691	25,845
RADNOR - - -	32,024	31,366	277,609	272,869	5,122	4,790
SCOTLAND.						
ABERDEEN - - -	183,212	179,153	223,490	216,080	11,417	10,721
ARGYLL - - -	63,263	62,177	1,019,728	1,015,088	4,147	4,472
AYR - - -	101,717	101,013	385,336	379,551	12,498	15,376
BANFF - - -	45,513	43,960	67,474	68,245	2,713	2,696
BERWICK - - -	18,091	16,356	321,587	319,543	3,632	3,632
BUTE - - -	9,828	9,967	49,061	48,577	713	788
CAITHNESS - - -	22,325	22,781	122,970	113,806	1,424	1,516
CLACKMANNAN - -	4,124	4,173	14,672	14,299	1,901	2,122
DUMBARTON - - -	15,311	15,686	78,290	76,156	1,589	1,604
DUMFRIES - - -	60,382	60,448	566,983	551,656	9,794	9,239
EDINBURGH - - -	21,499	21,175	191,196	186,164	7,792	6,545
ELGIN, or MORAY	23,898	23,186	70,544	67,592	2,534	2,767
FIFE - - -	52,748	50,703	121,577	109,756	5,047	5,482
FORFAR - - -	56,144	52,950	165,020	157,937	6,246	6,672
HADDINGTON - -	11,530	10,588	131,580	125,354	1,756	1,654
INVERNESS - - -	53,314	53,375	644,667	639,917	2,567	2,617
KINCARDINE - - -	27,936	27,388	43,905	44,526	2,450	2,470
KINROSS - - -	6,892	6,830	39,502	37,374	523	410
KIRKCUDBRIGHT	49,175	48,049	405,726	400,823	7,745	6,695
LANARK - - -	75,318	73,518	248,818	244,072	8,025	7,547
LINLITHGOW - -	12,869	12,179	27,107	26,802	1,961	1,380
NAIRN - - -	6,471	6,413	19,396	20,446	670	722
ORKNEY - - -	28,661	29,422	37,539	37,805	2,637	2,850
PEEBLES - - -	7,391	7,096	195,852	185,396	643	630
PERTH - - -	78,665	78,270	741,152	720,334	7,325	7,769
RENFREW - - -	26,779	26,420	42,206	42,974	1,401	1,507
ROSS and CROMARTY	44,986	44,641	323,000	329,758	5,001	5,101
ROXBURGH - - -	18,100	17,054	537,154	517,887	3,364	3,282
SELKIRK - - -	3,428	3,002	187,108	183,691	438	496
SHETLAND - - -	19,219	18,914	98,150	92,570	2,895	2,895
STIRLING - - -	34,923	34,475	128,663	120,649	2,242	2,410
SUTHERLAND - -	12,719	12,578	207,075	201,244	880	963
WIGTOWN - - -	49,853	49,603	131,420	127,796	10,146	10,291

THE FRENCH DAIRY INDUSTRY.

The number of milch cows in France was found at the time of the Decennial Agricultural Inquiry in 1892 to be 5,407,126, compared with 5,019,670 in 1882—an increase of 387,456, or nearly 8 per cent. Inasmuch as the increase in *all* cattle, during the same period, was from 12,997,054 to 13,708,997 (*i.e.*, 711,943, or about $5\frac{1}{2}$ per cent.), and the increase in cattle other than milch cows was little more than 4 per cent., it would appear that more attention has been devoted to dairying than to the maintenance of cattle for other purposes during these ten years. Bulls and draught oxen have declined, but the number of bullocks being fattened exhibits an increase.

The north of France is, as is well known, the principal seat of the dairying industry, and it is here that the greatest number of milch cows are to be found; the departments with the largest number being, in the order named, Ille-et-Vilaine, Finistère, Côtes-du-Nord, Morbihan, Nord, Puy-de-Dôme, Loire-inférieure, Seine-inférieure, and Manche. Of these only the Puy-de-Dôme can rank as a southern department. If we reckon the number of (all) cattle in proportion to the agricultural surface, we find that the department of Finistère carries nearly 26 head to every 100 acres, followed by the Morbihan, Vendée, Manche, Mayenne, Ille-et-Vilaine, Nord, etc. The preponderance of the Breton departments in these comparisons will not escape notice, but it is due to the small size of the Breton cattle, of which it is said that ten cows of this breed can be kept where it would be difficult to support three Norman beasts. In fact, if we compare the weight of cattle per 100 acres, we find that the Norman departments, with the Seine (which, as it consists almost entirely of Paris and its suburbs, naturally contains but

little agricultural land), are at the top ; the highest average being reached in the Nord with 156 cwts. of cattle per 100 acres, the Ille-et-Vilaine being only sixteenth.

The production of milk from these 5,407,126 milch cows, or rather from 90 per cent. of them—the remaining tenth being assumed to yield no milk—during the year 1892 is estimated at 1,694,294,338 gallons, as compared with 1,500,531,230 gallons in 1882. The departments yielding most milk are the Nord (79,466,398 gallons), followed at some distance by the Seine-inférieure, the Manche, Ille-et-Vilaine, Pas de Calais, Calvados, Finistère, all with over 46,000,000 gallons. The yield per cow was estimated to have been about 352 gallons in 1892, as against 330 gallons in 1882. Since 1892 the annual production of milk in France is estimated, in the annual reports of the French Ministry of Agriculture, to have been in the years named—

							Gallons.
1893	...	...	...	...	...	...	1,531,235,002
1894	...	...	...	...	...	...	1,681,225,194
1895	...	...	...	...	...	...	1,719,641,550
1896	...	...	...	...	...	...	1,734,995,746

These annual estimates are not strictly comparable with those of the decennial returns : for 1892 the Ministry of Agriculture estimated the production at 1,750,967,504 gallons, whereas the Decennial Inquiry published last year showed the amount to have been 1,694,294,338 gallons. But the annual figures indicate the changes from year to year. Very little French milk is exported in a raw state, although an appreciable quantity—some 2,000 cwts., *i.e.*, about 22,000 gallons—of fresh milk or cream was exported to the United Kingdom towards the end of last year.

For the manufacture of dairy products the latest figures available are those of the Decennial Inquiry relating to 1892. The production of butter in 1892 is given as 2,593,300 cwts. Four departments in the south, as also the Seine (Paris and environs), make no mention of any production of this commodity, and it is not clearly stated whether none was actually made in these departments, or whether the persons concerned omitted to make proper returns.

The great butter-producing districts are, as might be expected, Brittany and Normandy, as well as the extreme north. The departments which in 1892 produced the largest quantities are Ille-et-Vilaine, with 161,582 cwts.; Nord, with 142,063 cwts.; Calvados, 138,275 cwts.; Pas de Calais, 112,427 cwts.; and Manche, 108,218 cwts.

France has for many years exported considerable quantities of butter to this country; an exceptional maximum of over 700,000 cwts. having been shipped to our shores in 1874. During the last twenty years, however, no progress has to be recorded in this direction, and the French exportation has remained practically stationary, and, in fact, exhibited a slight decline. As the rapidly increasing consumption of foreign butter in this country has been largely supplied by other countries, France has been greatly outstripped, and from holding the premier position and supplying 37 per cent. of our imports in 1877, she in 1897 only supplied 14 per cent.

Examination of the French trade returns for 1896 shows that four-fifths of the butter exported from France comes to this country. Practically the whole of this export is of French origin; the trade returns exhibiting in 1896 an export to this country of 425,239 cwts., of which only 11,459 cwts. had come through the country in transit trade, the whole of which, it may be noted, came from Italy. The little butter which in 1896 was not exported to Great Britain, or consumed within the country, was despatched chiefly to Brazil and Belgium.

Of cheese, the French people make a somewhat larger quantity than of butter, and particulars of its production are given in the 1892 inquiry in much more detail than in the case of the other comestible. The total amount, both in 1892 and 1882, is however understated, and it is remarked that no returns, or only deficient returns, were received from certain departments in which the manufacture of butter was of preponderating importance. This omission chiefly affects the cheese very generally consumed on the farm.

The 1892 returns distinguish between the various kinds of cheese according as it is hard or soft, and also according as to

whether it is made of whole or skim milk. The production of the various sorts is best shown in tabular form :—

PRODUCTION OF CHEESE 1892 AND 1882 (000 OMITTED).

	1892.		1882.	
	Milk used.	Cheese produced.	Milk used.	Cheese produced.
Hard cheese :	Gallons.	Cwts.	Gallons.	Cwts.
Gruyère and the like -	55,094	365	47,300	290
Full cheese - -	39,316	350	} 477,730	1,963
Skim cheese - -	121,405	474		
Soft cheese :				
Full cheese - -	76,544	815		
Skim cheese - -	182,899	680		
Total - -	475,258	2,684	525,030	2,253

It will be noticed that the quantity of milk used in 1892 was returned as less than in 1882, although considerably more cheese was produced. Considering the localities which furnish the greatest quantities of cheese, it will be observed that the great butter-producing districts do not occupy the same pre-eminence in this manufacture; the cheese-producing departments being, generally speaking, in the east, especially the districts near the Swiss frontier, and only one Norman department is high up in the list. The principal cheese-producing departments, with an output of over 5,000 tons in 1892, are the Seine-et-Marne, 143,389 cwts.; Jura, 122,915 cwts.; Haute Savoie, 119,939 cwts.; Cantal, 118,388 cwts.; Vosges, 108,301 cwts.; Calvados, 105,218 cwts.; and Doubs, 100,698 cwts. In this connection, and as explaining the prominent position of a comparatively central department, it may be mentioned that the Brie (well known for its variety of cheese) is a district to the south-east of Paris, mostly in the Seine-et-Marne.

Although the manufacture of cheese is thus a more important industry in France than butter, it does not constitute anything like so large an item in the external commerce. Our own trade returns, indeed, show an importation in recent years of some 50,000 cwts. of cheese from France, a maximum of 58,346 cwts. having been recorded in 1893 (this

had fallen to 36,000 cwts. in 1897); but the greater part of this was not of French origin. The French trade returns for 1896 show that just about one-quarter of their exports to this country were in that year of home production, cheese from Switzerland, Italy, and Holland bulking largely in the transit trade, although these returns do not indicate what proportion each of these countries contributed to the British supply. Nor is Great Britain by any means so preponderant a factor in the export trade of this commodity as in the case of butter, most of the home-made cheese exported going to Algeria and Belgium, while Germany also takes as much as Great Britain.

If 1892 may be taken as a year of average consumption, the relative importance of butter and cheese to the French consumer may be gauged approximately by adding the imports of these commodities to, and subtracting the exports from, the production of that year. By this method we arrive at the following results in the year named :—

Butter : Production, 2,593,300 cwts. ; imports for consumption, 107,672 cwts. ; exports of home produce, 690,237 cwts. ; consumption, 2,010,735 cwts.

Cheese : Production, 2,684,280 cwts. ; imports for consumption, 243,280 cwts. ; exports of home produce, 131,826 cwts. ; consumption, 2,795,722 cwts.

As already noted, the production of cheese is understated, while it is probable that the same remark may apply to the butter ; but, accepting these figures as accurate, we obtain a total consumption per head (assuming a total population of 38,000,000) in the year 1892 of 5.9 lbs. of butter and 8.2 lbs. of cheese.

As regards the magnitude of the dairy industry in France, estimated in money, the total production of milk, at 7d. per gallon, is calculated to be worth £48,921,020. The gross value of the entire production of butter at 9 $\frac{3}{4}$ d. per lb. is put at £11,802,840, and the cheese at a total of £5,129,880, or an average of all sorts of 4d. per lb. The total annual value of the two manufactured milk products is thus £16,932,720.

APHIDES.

The season of 1898 has witnessed an unusually widespread attack of aphides, or "green flies," as they are commonly called, upon trees, plants, and flowers of many kinds. (Aphides are termed "green flies" indiscriminately, as if they were of the same species, though each kind of tree, plant, and flower has its peculiar species, with as well-defined distinctions as the host upon which it is found.) It is believed that the mildness of the winter and the absence of sharp frosts preserved the hibernating aphides of species that are generally affected by normal winter weather; while the abnormally small rainfall also favoured, without doubt, the preservation of these species.

Among the trees most seriously attacked by aphides were limes and beeches. The foliage of the former trees, in some cases, shone with the honeydew falling from the numbers of aphides on the under surfaces of the leaves; their fragrant blossoms were materially lessened by the injurious action of the insects; and many of the leaves withered and fell prematurely. Varieties of ornamental limes in gardens and shrubberies, such as *Tilia argentea*, *europæa*, and *euchlora*, suffered particularly from the continuous action of aphides in the past season. The aphid infesting limes is known as *Pterocallis tilie*, of the family *Lachnina*, whose wingless viviparous female is yellowish-green with a black head, and a long and narrow body with black stripes upon the abdomen. The winged female is yellow with dark legs, and ample iridescent wings with forked cubital veins.

Boussingault states that in Switzerland these aphides often kill lime trees by their persistent attacks.

The beech aphis (*Phyllaphis fagi*) belongs to another genus of the *Lachninae*. It seriously injures the common beech (*Fagus sylvestris*), as well as the "Copper" or Purple beech. There were many complaints of harm caused by aphides to Purple beech trees in gardens and shrubberies. The insects swarmed on the under sides of the leaves and changed their rich glossy colour to dull sombre tints. This aphis covers itself with a waxy exudation resembling white cotton or silk, which with the "honeydew" forms a nasty, sticky mass on the lower parts of the leaves. The wingless viviparous female is green when deprived of its cottony coat, with a rather narrow body, large red eyes, and a short beak or rostrum.

With regard to remedial measures against these aphides infesting trees, it is impossible to adopt any in the case of fully-developed and large trees. Young trees and fair-sized trees in gardens, public parks, and in shrubberies may be syringed with soft soap and quassia by means of specially constructed garden engines, having strong pumps. In several instances purple beeches were syringed in this way with very great advantage. The mixture used was 7 lbs. of quassia chips and 7 lbs. of soft soap to 100 gallons of water.

Peach and nectarine trees were infested with the aphis named *Aphis amygdali*. As the fungus *Exoascus deformans*, causing what is termed the "curl," was abundantly present in many gardens, this aphis was not always held to be the author of much harm, though, in fact, it did incredible mischief to the trees as well as to the crop of the present year. Spraying and syringing with soft soap and quassia, in the proportions of 6 lbs. of soft soap and 6 lbs. of quassia chips to 100 gallons of water, was successfully adopted in the case of this insect. Spraying, too, with a weak solution of sulphate of copper and lime, at the rate of 5 lbs. of sulphate of copper and $2\frac{1}{2}$ lbs. of lime to 100 gallons of water, was useful against the "curl" fungus.

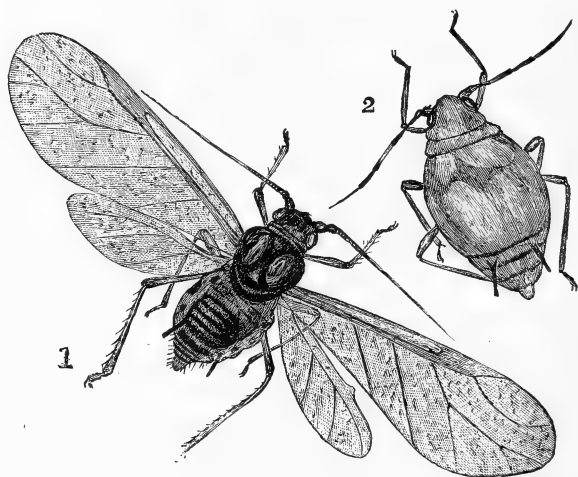
The "blight," as the attack of aphides is termed in Kent, sorely beset the hop plants. There has seldom been such a

persistent visitation. As fast as the hop growers washed off the insects fresh swarms appeared, and, where spraying or "washing," as it is called in the hop districts, was neglected, the leaves turned black, and the cones were black and full of filth. The hop aphid (*Phorodon humuli*) is distinguishable by the lowest joint of the antennæ being toothed, and each of the frontal tubercles is also furnished with a tooth. A remarkable feature in the life history of this aphid is that it migrates from trees of the *Prunus* tribe to the hop plants in the spring, returning to the former to lay eggs upon them, in which state the winter is passed. Clouds of winged aphides may be seen in September leaving the hop grounds on their way to the plum, damson, and sloe trees in the neighbourhood, and, in the spring, flights of winged females are again seen coming from the plum and damson trees. It was long ago believed that there was a migration of these aphides from plum and damson trees to the hop plants, and Professor Riley determined this by close observations made near Maidstone in 1887. There is little doubt that besides the hibernation of this insect in egg-form upon trees of the *Prunus* tribe, there are some wingless viviparous females, which hibernate in the ground close to the hop hills, if the weather is not abnormally severe, and produce young upon the first approach of spring. In many hop districts, notably in Kent, where there are numbers of damson trees, and where the plantation of these trees is gradually extending, aphid blight regularly recurs, and with increased intensity, entailing enormous expense in washing the plants, which operation frequently has to be done five and even eight times.

But this hop aphid—which comes from plum and damson trees in the spring and returns to them in the winter, when eggs, to be seen easily with a pocket lens, are laid on the twigs and branches—must not be confounded with the plum aphid (*Aphis pruni*). This insect, figured on next page,* remains upon plum and damson trees throughout the year, and is quite a distinct species from the hop aphid. It makes

* This figure, and those of the currant and cherry aphides, have been reproduced by the kind permission of Mr. Buckton from his monograph on British Aphides.

its appearance in the form of wingless females, popularly known as green lice, the products of eggs laid in the autumn. These bring forth living young, which again give birth to lice and multiply in a remarkable manner, there being, according to Westwood, nine generations. In seasons of bad attacks, notably in the last (1898), by the time the damsons are formed they are beset by aphides which suck up the juices from the stems and the leaves near them, and cause them to drop off, or to be stunted and mis-shapen. Plum trees are also often seriously injured in the same manner, but not so much as the damson trees. As a rule, prudent fruit-growers spray or "wash" damson and plum trees, before the fruit is formed, with solutions of soft soap and quassia, made



PLUM APHIS (*Aphis pruni*).

of the extract of 6 or 7 lbs. of quassia chips and 6 lbs. of soft soap to 100 gallons of water. This solution, thoroughly applied, was very efficacious in the past season in clearing off the aphides and their filth. It is found that Paris green, mixed with the quassia and soft soap solutions, makes them far more effective. Only a very small quantity of Paris green is used for this purpose, four ounces to 100 gallons of this solution being found sufficient to affect insects without injuring the blossoms and leafage.

The apple aphis (*Aphis mali*) makes its appearance as soon as the leaves show signs of coming forth, and it follows up

the blossoms from their earliest development. It is very destructive to the blossom of certain kinds of apple trees whose leaves are hardly out when the blossom is formed,—as a rule, the blossom of apple trees appears before the leaves are perfectly developed. The aphid attacks the blossoms, which are sweet; and either prevents fructification, or so attacks the tiny fruitlets, that, weakened by the extraction of their juices, they do not “set” properly. Those that manage to set rarely attain to full size and perfection. As the leaves of the trees come out they are covered with aphides and curl up, become black, and finally fall.

APPLE APHIS (*Aphis mali*).



Fore and hind wings; winged viviparous females, mag.; oviparous female, mag.

The winged viviparous female shown above has a light green body with black markings, and wings with peculiar neurations. The egg-laying females are somewhat round in shape, they deposit little black eggs between the folds of the rind near the buds at the end of the summer. These are hatched in the early spring and produce wingless viviparous dark green females, called by German entomologists *Stammütter*, and “adult queen aphides” by Mr. Buckton, from which are produced many generations of lighter green larvæ, the main cause of the active injury to the leaves and blossoms. These larvæ have long rostra, or suckers, and are covered with fine white powder. It is considered that in some cases, and when the winter season is mild, wingless viviparous larvæ hibernate as in the case of the hop aphid. Washing or spraying apple trees is of great benefit if it is done early and well. It not only clears away aphides but at the same time materially checks the winter moth and other allied caterpillars, as well as the apple sucker (*Psylla mali*),

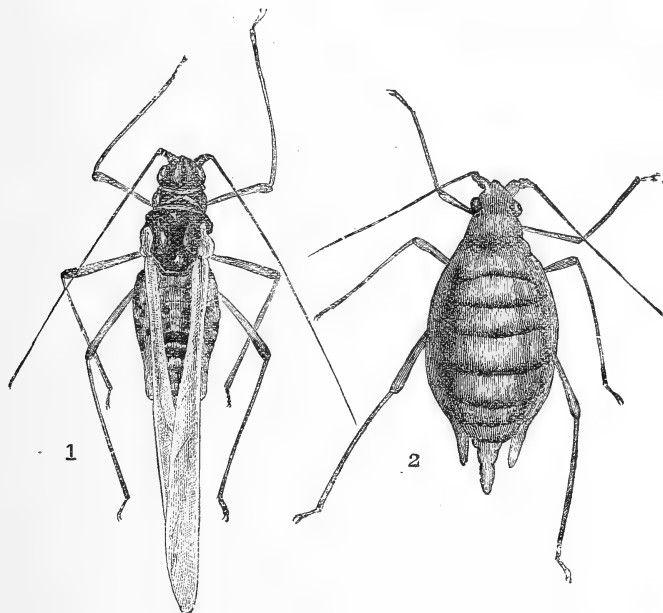
and the apple weevil (*Anthonomus pomorum*). The materials used for spraying apple trees are the extract of 6 lbs. or 7 lbs. of quassia chips and 6 lbs. or 7 lbs. of soft soap to 100 gallons of water. Paris green added to this in the proportion of 4 ozs. to 100 gallons of the mixture is of great advantage, as it poisons the food of the insects and does not hurt the foliage or blossoms.

The multiplication of pests like the apple aphid and of other insects is much influenced by the neglected and unpruned condition of the apple trees. Where the bark is thick and full of deep fissures, and the branches are thickly twisted together, and when lichens and mosses are allowed to cluster densely upon the boughs and twigs, insects are generally far more numerous and destructive than upon trees that have been pruned properly, well scraped, and cleared from foreign growths. The lamentably neglected condition of many of the apple orchards of this country serves to intensify and to perpetuate the visitations and injuries of the apple aphid, the woolly aphid, the whole tribe of winter moths, the ermine moth, the apple blossom weevil the *Psylla*, the codlin moth, and other pests, to say nothing about equally dangerous fungi. Other insects also depend upon these neglected apple trees for their subsistence, or make them their shelter and refuge, from which they emerge to blight or destroy other crops.

Among aphides which were particularly abundant and troublesome to black and red currants during the past season was the *Rhopalosiphum ribis*, the currant aphid, which makes galls, or swellings, upon the surfaces of the leaves of black or red currant bushes. The galls are usually of a red colour, and upon examination of the under surfaces it will be seen that there are companies of larvæ engaged in sucking up with their club-shaped syphons the juices from the leaves, causing them to blister, curl up, and eventually fall. The currants in these circumstances often "shank" and "run off," like grapes in vineries where the conditions are unhealthy. The winged viviparous female (1) has large long translucent wings, and is prettily marked, having a yellow body with black and green bars and spots, a black thorax, and yellow

legs with black feet. At the end of the season wingless egg-laying females are evolved which lay long large eggs, and fasten them to the stems and twigs of the currant bushes. In the figure of this aphid, which is green in colour, it will be seen that the wingless viviparous female, or adult wingless female (2), has large cauda projecting beyond the cornicles.

CURRENT APHIS (*Rhopalosiphum ribis*).



1. Winged viviparous female. 2. Wingless viviparous female.

Both much magnified.

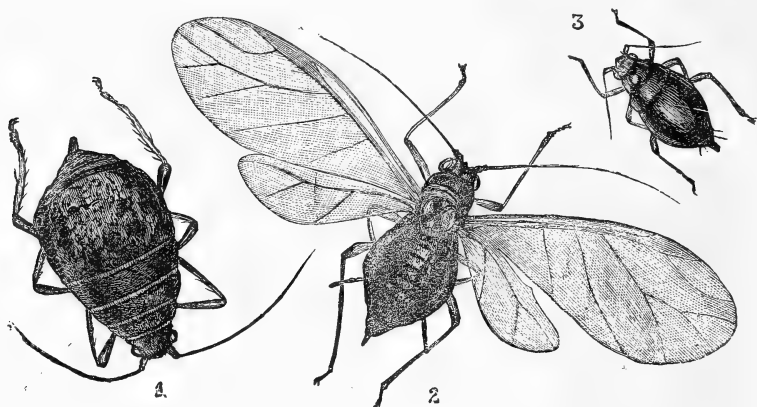
The *Myzus cerasi* is another aphid infesting currant bushes as well as cherry trees. The figure below shows that there are important differences between this and *Rhopalosiphum ribis*. The wingless female is much broader and has a somewhat squat form, being dark in colour with yellow legs, and the winged female's body is also much broader with different venation of the wings.

This insect does not make galls upon the leaves, but the swarms of larvæ congregate under the leaves and suck out their juices. They also emit quantities of the curious secretion known as honey dew, which falls upon the leaves below them, also upon the bunches of fruit, covering them

with sticky filth. The other currant aphid, *Rhopalosiphum ribis*, does not emit honey dew.

The action of *Myzus cerasi* upon cherry trees is the same as upon currant bushes. The leaves are pierced by countless beaks, or rostra, and the fruit is covered with honey dew.

CHERRY AND CURRANT APHIS (*Myzus cerasi*).



1. Apterous viviparous female. 2. Winged oviparous female.
3. Oviparous female. All much magnified.

It is almost impossible to use remedial measures for the attacks of these insects upon currant bushes. The leafage is so thick that spraying is a most difficult operation and could hardly be performed so as to reach the aphides upon the leaves within the bush, especially in the case of red currant bushes. It might be attempted early in the season, when the aphides are first discovered and the leaves not so dense. After infestation black currant and red currant bushes should be pruned more closely than usual. The cuttings should be taken away and burned. Spraying with kerosene emulsion might be tried, before the leaves appear, upon bushes infested in the previous season, as it might make the surroundings of the aphides unpleasant for them when they come on the scene.

Cherry trees fastened to walls may be easily sprayed, and small standards also, either with garden engines or knapsack machines. Large trees would require special machines with powerful pumps. The quassia and soft soap mixture, as prescribed above, would be the best to use. Spraying should be done early: as soon as aphides are seen.

Carrots and parsnips were much infested by an aphid, the former being injured somewhat seriously in various market garden districts and in allotment and private gardens. The leaves of many of the plants became quite shrivelled, and the roots were consequently stunted and deformed. The mischief was generally not quite so great in the case of parsnips, though in a few instances the roots were very poor and "spindly" from the exhaustion of the leaves by the aphides. Celery plants were also infested by the same aphid and somewhat injured. The species of aphid found upon the carrots and parsnips was that defined as *Siphocoryne pastinacæ*. The winged viviparous female is yellowish green with a dark green head and yellow legs. The wingless female is green with long vasiform cornicles. The legs and the antennæ are short; the rostrum is also short, club shaped towards the end, and finally terminates in a sharp black point. When very young the larvæ are often of a light brownish hue, but they soon turn to green.

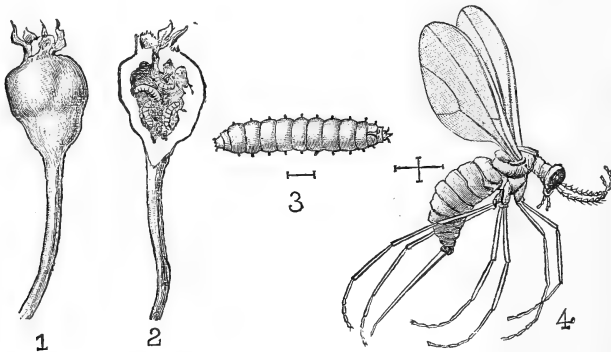
It is obviously difficult to spray carrots and parsnips, as they are so full of foliage, and the leaves of carrots are often close to the ground. It is not so difficult to spray celery plants if a knapsack machine is used, and if this is done early, with quassia and soft soap in which a little paraffin is mixed, churned up well together, it would also keep off the celery fly, a far greater pest than the celery aphid. Swedes and turnips were infested by the *Aphis* (*Rhopalosiphum*) *rapæ* in some parts of England and Scotland.

Aphides were abundant upon rose trees, and upon several species of garden lilies. In the former case they were easily cleared off by spraying with quassia and soap solutions, but this was nearly ineffective with the lilies, as the aphides were covered by the folds of the buds.

Field and garden beans were much infested by *Aphis rumicis*, the "Black Dolphin," and their crops in some places were seriously lessened. This aphid is black in all its forms, except in the very early stage, when it is brown. Little or nothing can be done to check this attack in fields; in gardens it is possible to spray infested beans.

THE PEAR MIDGE.

(*Diplosis pyrivora*, Riley. *Cecidomyia nigra*, Meigen.)



1. Pear stunted and malformed by the larvæ within it. 2. Section of pear with larvæ. 3. Larva, much magnified. 4. Female fly, much magnified. Lines showing natural length of fly and larva.

The injury caused by this insect is gradually increasing, and has been very serious this year in various places, reducing the crop of pears, which was already short on account of the unfavourable weather at the time of the "setting" of the fruit. Some pear growers seeing the young pears falling fast in June, when they are about the size of marbles, think that this drop is due to an unhealthy condition of the tree, or to influences of weather, but it is more often due to the insidious and dangerous action of the tiny pear midge, the presence of which is far more common than is usually believed. But this mischievous insect is becoming more generally known, and there have never been so many complaints concerning it in any previous season. In most instances the cause of the disorder was recognised, and remedies and modes of prevention only were asked for. In a few cases, where all the larvæ had left

the pears, and there were no indications of insect attack, inquiries were made as to the source of the injury.

An experienced and successful cultivator of pears, whose crops had been regularly destroyed by this midge, wrote that he feared it would be quite impossible to grow pears in his neighbourhood unless some cure were found. He added that his crop of the pear known as "Beurré de l'Assomption" was only two pears, although there was a splendid "set," and that in the previous year there was no fruit at all on these trees. Another grower said that he had seventy bush pear trees on quince stocks, and had picked off 2,000 infested pears from them; he had standards close by with infested fruit, but he could not hand-pick these. The infested trees were mainly of the sort named Williams' Bon Chrétien.

It would appear that early pears, and those that blossom early, are most liable to this infestation. Williams' Bon Chrétien is notoriously subject to it, and in America, where the pear midge is very prevalent and most destructive, the Bartlett pear (identical with Williams' Bon Chrétien) is chiefly attacked. Beurré de l'Assomption, earlier than Williams' Bon Chrétien, is also frequently seriously affected. Pitmaston Duchesse, Marie Louise, Jargonelle, Souvenir du Congrès, all early, and like the Bon Chrétien in many respects, are also especially liable to be infested. Infestation has been noticed on later pears, as Josephine de Malines and Catillac, but in a much less degree than on earlier varieties. Only forty yards distant from the pear orchard last alluded to was another containing sixty trees of Durendeu and sixty of Louise Bonne of Jersey, which were quite free from the attack. Louise Bonne of Jersey, although fairly early, is not quite so early as Williams' Bon Chrétien.

In America the Bartlett and the Lawrence are the varieties most commonly attacked, and it is said that in some districts there has lately been a loss of almost all the Lawrence pears, and a large proportion of the Bartletts, the attacks being so serious and frequent that growers in these localities speak of abandoning pear culture altogether. Professor Riley, writing in 1885, considered that the insect had been imported from Europe, as until it was found in 1880, upon a

certain farm near Meriden, in Connecticut, no insect of similar habits was known in the United States.

There is no doubt that it is the same insect as that termed *Cecidomyia nigra* by Meigen. This is affirmed by Schmidberger, who first described the habits of this insect in 1831. He says: "The species of gall-midges found by me in the pears are evidently the *Cecidomyia nigra*, because the description which Meigen gives of the black gall-midge completely agrees with this. I retain Meigen's name, and call it the black gall-midge." Riley, however, suggested that the name of *Diplosis pyrivora* would be more suitable, and this has been adopted by dipterists. It is not known how long it has been at work in this country. It was first mentioned twenty-five years ago, and there is every reason to believe that it had been present here long before this, for its action upon pears, as pointed out above, closely resembles that of weather and other natural causes, and might easily have been mistaken for these, especially as there were then comparatively few trained observers.

Life History.

The fly is nearly one-tenth of an inch long, with an expanse of wings equal to close upon one-fifth of an inch. Its slender body is dark grey, approaching black, in colour; its antennæ, with twenty-six joints in the male, are brown and very long; its legs are also very long, and yellowish brown. The female is slightly longer than the male, having antennæ with fourteen joints, and an exceedingly long ovipositor for the purpose of depositing her eggs in the calyces of the blossoms of the pears. Schmidberger witnessed the process of egg-laying, and describes it as follows: "I found the first gall-midge in the act of laying its eggs in the blossom; this was on the 12th of April. It had fixed itself almost perpendicularly in the middle of a single blossom, and having pierced the petal with its long ovipositor, it laid its eggs on the anther of the still closed blossom. This female was about seven and a-half minutes laying her eggs. When she had flown away, I cut the pierced bud in two, and found the eggs lying in a heap one upon another on the anthers. They were white, longish, pointed on one side, and transparent, and from

ten to twelve in number. I afterwards found several midges engaged in laying their eggs as late as the 18th of April, from which day they ceased to appear in the garden. I also saw a midge on the side of the blossom with its ovipositor inserted in it, so that they do not merely pierce the petals, but the calyx also."

The number of eggs, according to Schmidberger, varies from a few to more than twenty. They are hatched in a very short time if the weather is warm. Schmidberger found small larvæ on the fourth day after the deposition of the eggs, which begin to bore into the blossom usually in or near the stem of the calyx. "Before the blossom is expanded they descend to the core, so that they may not be exposed to the sun's rays, which would endanger their existence. They separate at the core and begin to devour it on all sides. When they have consumed the pulp of the small fruit they have attained their full size, and only await for a favourable opportunity to leave their still secure dwelling." Sometimes they fall from the pears to the ground; sometimes they fall with the infested pears, from which they emerge and bury themselves in the earth to a depth not exceeding one inch. The larva is endowed with powers of jumping like other species of *Diplosis*. It can also crawl well, but it has no legs. It is rather more than a twelfth of an inch long. In colour it is whitish-yellow, becoming rather darker as it gets older. It has what is known as the "anchor process" or "breast bone," which serves as an adjunct to the mouth in biting pulp and tissues, "broadly dilated," as remarked by Professor Riley. This is light-brown in colour, bifurcate in shape, and is easily seen with an inch lens. It is not known when the pupal state is assumed. It has been ascertained that the larvæ remain for some time in larval condition before commencing their cocoons, and that they remain, according to Riley, in the cocoons for some time before being transformed to pupæ. The pupa is about one-tenth of an inch long, black above and yellowish-brown beneath.

Methods of Prevention and Remedies.

It is absolutely certain that the author of this mischief to the pear crop is lying just under the pear trees from June

until the end of March, and only about an inch below the surface of the ground. It may therefore be assumed that thoroughly digging the ground beneath the boughs of the pear tree, making allowance for the skipping or jumping habits of the larvæ as they come from the pears, will bury the larvæ so that the flies cannot emerge. This should be done as a means of prevention where possible. It would be necessary to dig the ground with digging "spuds" so as to completely turn it over, and the action of winter rains and frosts would pulverise it and make it compact, and thus prevent the flies getting through the clods. Obviously this could not be done in grass orchards. Dr. J. B. Smith, who has closely investigated this subject, says "ploughing an orchard" (and ploughing is a frequent mode of cultivating orchards in America) "infested by the midge, after the middle of June, or, in fact, at any time during the summer so as to turn the soil at least four inches, will probably result in burying beyond resurrection a great proportion of the midges." Ploughing is not adopted in England, but many orchards are dug, and in gardens it would be easy to adopt this practice. Dr. Smith, who has made careful experiments in connection with the pear midge, has also found that dressings of kainit immediately under infested trees have been most effectual in killing the larvæ. He recommends that the ground under the trees should be top-dressed with one ton of kainit per acre, and mentions an instance of an orchard thus treated, of which the fruit practically escaped infestation, while in an adjoining orchard not treated he failed to find a single fruit that was not infested with larvæ. This treatment has been successfully adopted by several pear growers. The kainit should be put on between the middle and end of June, before or immediately after rain. It is also suggested that ploughing or digging might advantageously follow towards the end of July or in August. Where pear trees are in grass orchards the grass should be cut very close before the kainit is put on. It is desirable to apply the kainit before the larvæ get into cocoons, as it has much more effect upon them in their naked state. Rain, or the moisture of the atmosphere, causes the kainit to

dissolve slowly and the caustic solution thus formed burns the tender bodies of the larvæ that are within its influence.

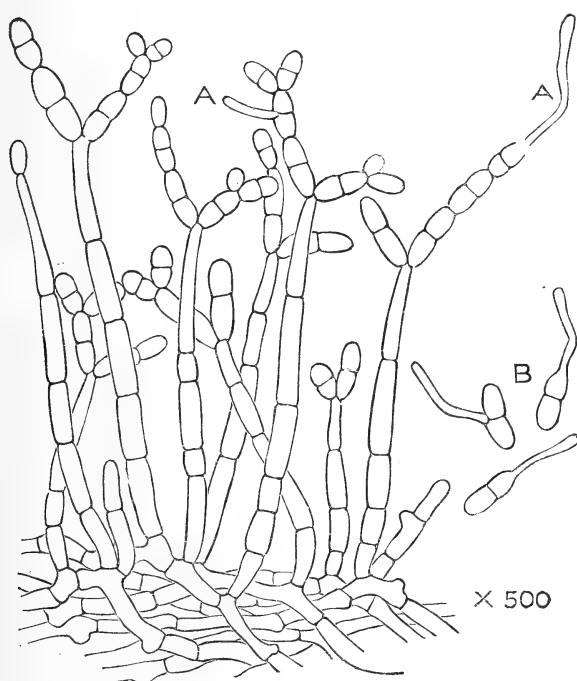
With respect to actual remedies it must be said that they are few and not satisfactory. Spraying with insecticides is of no avail. Spraying with offensive materials, as paraffin or carbolic acid, might prevent egg laying if done just at the right moment. Dr. Lintner suggests sacrificing the Lawrence pear crop by spraying Lawrence trees with London purple just after the fruit is formed in order to kill midges and starve the larvæ within them. But unfortunately other pear trees are liable to infestation, and in England it would be more difficult to select the trees most subject to this attack for this purpose. Picking-off and burning infested fruit can be adopted in the case of small bush, espalier, wall trees, and even half standards; but it could not be done on standards. As a rule infested pears can be recognised by their malformation, so that it would be easy, after the pickers were instructed, to pick them off and leave the sound pears.

FUNGI INJURIOUS TO TOMATOES.

There have been numerous complaints this season of serious injury to tomatoes caused by fungi, and it appears that fungoid affections of the tomato plant, especially when cultivated under glass, are increasing. There are several fungi which attack tomatoes. One, the *Cladosporium lycopersici*, which attacks the fruit alone, was described in the "Journal of the Board of Agriculture," Vol. III., p. 154. In the present year two others have been especially troublesome, viz., *Cladosporium fulvum*, and *Fusarium lycopersici*, commonly called the "sleeping disease."

The fungus *Cladosporium fulvum* ("yellow blight"), of which a figure is given on next page, is frequently the cause of great losses in tomato-houses, and it is difficult to stamp out when it has once become established. It is well known in Great Britain, in the United States, in France, and in Germany. At one time it was very destructive to tomato plants in Guernsey, but latterly, owing to careful treatment and better management of the temperature and aeration of the houses, it has not been nearly so troublesome. The fungus shows itself, soon after the plant has become well established, upon the under surfaces of the leaves in the form of patches, which are seen with the aid of a glass to be whitish tufts composed of spore-bearing branches. These patches after a time become brownish in colour as the spores ripen and are discharged. The upper parts of the infected leaves become yellowish, first at their tips and afterwards all over their upper surfaces. The leaves after a time shrivel up and cannot perform their proper functions. The plant either does not form fruit, or if fruit is formed it is small, misshapen, and ripens prematurely. In some cases the fungus attacks the fruit itself and is seen

upon it in the form of brownish spots with green edges. The stems and branches also often become infected, being covered with long brown or dusky streaks, and the plant finally succumbs altogether. The disorder is most infectious, as the spores are carried from plant to plant by the lightest airs. In several cases tomato growers found that it had spread most rapidly throughout the whole of their tomato plants, and that if the infected plants were shaken, clouds of spores were raised like dust.



YELLOW BLIGHT (*Cladosporium fulvum*).

A. Conidiophores.
B. Spores germinating.

The spores alighting upon tomato plants, in favourable conditions, form mycelium, with colourless septate filaments which penetrate and permeate the tissues of the leaves, causing them to turn yellow and decay. From the mycelium, branches bearing spores are formed in dense tufts (A). The spores are of an oval, or elliptical, shape, and speedily germinate if warmth and moisture are present.

The fungus *Cladosporium fulvum* belongs to the group of

Imperfect Fungi (*Fungi imperfecti*), many of which are only known in a conidial form, being presumably merely stages in the life-history of other species of fungi. It is considered by some authorities that *Cladosporium fulvum* is the conidial state of another fungus whose host may be the stem or other parts of the tomato-plant.

Rational treatment of tomatoes produced in houses has already, as stated above, greatly checked the attack of this fungus in Guernsey. Damp heat favours the development and increase of fungi, and is by no means necessary for the successful growth of tomatoes. By the rational process a warm, dry air has been substituted, obtained by fire-heat circulated by means of thorough ventilation, arranged so that cold draughts are avoided and an even temperature assured. Water also has been given in judicious moderation, so as not to cause undue moisture in the atmosphere. An experienced cultivator of tomatoes has found that the exposure of plants, showing a disposition to infection, to a temperature of 100 deg. Fahr., at intervals of a week or so, is a valuable remedy, and it appears that exposure to this heat for two or three hours does not hurt the plants. In the cultivation of tomatoes it should be remembered that they do not require the temperature necessary for cucumbers and melons, but rather a medium approximating closely to natural out-door conditions.

In order to ward off fungoid diseases, it is desirable to spray tomato plants early in their growth with a weak sulphate of copper mixture—*bouillie bordelaise*—composed of half a pound of sulphate of copper and half a pound of lime to ten gallons of water. Spraying with this dressing should be repeated and the solution evenly distributed all over and under the leaves. When the foliage is older the amount of sulphate of copper and lime might be increased to three-quarters of a pound of each to ten gallons of water. In America ammoniated carbonate of copper, made by dissolving three ounces of carbonate of copper in a quart of ammonia, is used with advantage. Two ounces of this mixture are put into two gallons of water and sprayed evenly over the plants.

Sulphide of potassium (liver of sulphur) has also proved useful, put on with a "Knapsack," or other suitable spraying machine, in the proportion of five ounces of sulphide of potassium to ten gallons of water. It need hardly be added that in all these solutions or mixtures the greatest care must be taken to dissolve and mix the materials thoroughly, and the quantities must be accurately measured.

It is most desirable in cases of infection that, after the crop has been gathered, the plants should be removed, root, branch and leafage, from the houses and burned, and that the soil should be dressed with quicklime or gas lime, and deeply dug in order to dispose of hibernating forms of the fungus. The walls of the houses where infection has prevailed should be thoroughly washed with lime-wash made from very quick lime, finely powdered, with which a little sulphur has been mixed. This must be worked into every interstice in the bricks, stones, and wood.

The progress of the infection may sometimes be stayed by removing plants directly they are seen to be diseased.

The other fungus, *Fusarium lycopersici*, is more insidious and dangerous in character than *Cladosporium fulvum*, and most difficult to prevent and treat remedially. It has caused serious harm in many tomato-houses in England and in the Channel Islands. It is termed "sleeping disease," because there are no outward signs of its presence until the plant is in an advanced stage of growth. The first signs of its attack are the fading of the leaves of the infected plants, which become dull in colour, and a marked condition of unhealthiness. The leaves droop and have a wilted appearance, and some of them wither and fall off. In course of time the plants cease to grow, they become bent and deformed. If fruit is formed it is very short in quantity, and usually wanting in size, colour, and flavour.

It seems that this disorder is increasing, as many complaints have been received concerning it. In some cases the whole of the plants in large houses have been infected and destroyed. In 1897 one large grower lost about 10 per cent. of his plants in certain houses, and in the present year he planted 25,000 plants, all of which succumbed to this

disease. After thoroughly trenching the soil, applying a large quantity of unslacked lime before trenching, and well fumi-gating the houses with sulphur, he planted another set of plants, and obtained a satisfactory crop of tomatoes. Similar treatment has materially lessened the ravages of the sleeping disease in Guernsey, though it is by no means stamped out there.

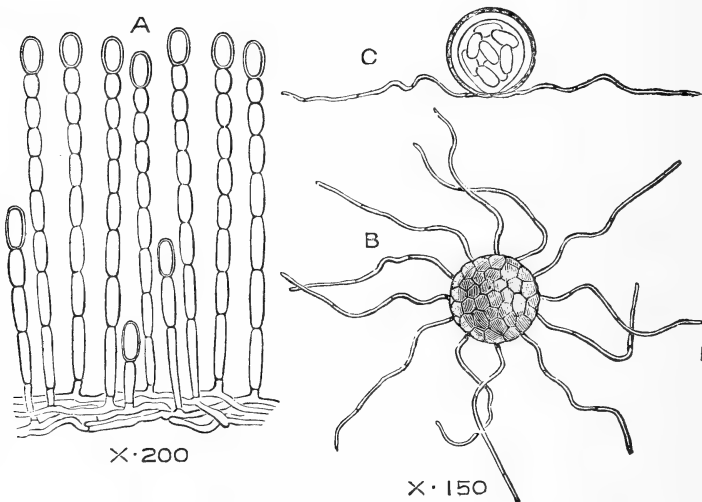
The minute fungus causing this disease is known as *Fusarium lycopersici*. It is produced by resting spores which hibernate in the soil and infect the plants by the medium of their root hairs or rootlets, also by means of the seeds from infected tomato plants containing vegetative parts of the fungus. Mr. Massee, who has made many investigations of this fungus, has not yet been able to find the mycelium in the seeds of infected plants; but he suggests that it may be in the form of mycoplasma, and believes that the fungus may be propagated by the seed. Mycelium is soon formed, and begins to ascend the stem. If the stem of a "sleeping" plant is cut lengthways, it will be found that the vascular tissues are unhealthy, as shown by their brown colour, while the rootlets become rotten, and the roots on being cut through will be seen to be discoloured. In course of time the lower parts of the stems of infected plants are covered with a white growth, like mildew, hardly discernible without a glass, composed of branches bearing spores. These spores may reproduce the fungus on other tomato plants, being conveyed to them by the air or by other media. Mr. Massee, in his valuable paper published in the *Gardeners' Chronicle*, June 8th, 1895, on the life history of this fungus, says that the spore-bearing branches on the stems agree with a genus of fungi called *Diplocladium*, and he terms them the *Diplocladium* stage of this tomato fungus. After a while the stem becomes much decayed, and then crescent-shaped spores are formed, representing the conidia of the second or *Fusarium* stage of the fungus. "Finally," Mr. Massee says, "the mycelium that has produced the *Diplocladium* and *Fusarium* stages of the fungus in succession at last bears numerous resting spores, which tide the fungus over the winter."

In an article upon tomato disease in Guernsey, which

appeared in the Journal of the Royal Horticultural Society (Vol. XIX., Part I.), Mr. A. Collenette, in treating of this "sleeping" disease, says:—"As growers ripen their fruit as far as possible upon the dying plants, it is only reasonable to suppose that the tomatoes themselves, and probably also their seeds, contain the germs of the disease. . . . Sections of tomatoes from diseased houses were made for me, and these were sufficient to satisfy me that the disease may be perpetuated through the seed. . . . My theory is, then, that the 'sleeping' disease is really primarily propagated by the seed, and the first thing to be done is to refuse to take or use the seed derived from the diseased plants." This view is, as has been shown above, corroborated by Mr. Massee in some degree, as well as by the experience of a large grower. The latter gentleman, having an excellent crop of a certain variety of tomato, saved the seed, but in the second year a considerable percentage of the crop was affected by the sleeping disease, and in the third season the whole of the plants of this variety were attacked so that they were all pulled up. The houses were then immediately filled up with plants of another variety, which remained free from disease.

It seems obvious that care must be taken not to save or sow seeds from tomato plants infected by this fungus. Plants that are infected should be at once pulled up, taken away, and burned. The holes should be treated with fresh, finely powdered lime, well incorporated with the soil. This may prevent the spread of the fungus if it originates from resting spores. But if the attack arises from infected seed it will probably spread through the house and necessitate the pulling-up and burning of the entire crop. The soil should be then sterilised, either by deeply trenching and digging, and ceasing to plant it with tomatoes for a year at least; or by applying large quantities of hot, finely powdered lime or finely powdered gas lime. Where resting or fallowing the soil in the houses is adopted, tomato plants may be grown in pots in the houses. The walls of the houses in which there has been infection should be thoroughly washed with lime and sulphur.

STRAWBERRY MILDEW (*Sphaerotheca pannosa*).



A. Conidiophores. B. Perithecium. C. Section of Ascus showing the spores.

Strawberry plants were seriously affected in many places during the season of 1898 by the strawberry mildew, a fungoid disorder which attacks first the leaves, causing them to curl and shrivel up, and then the fruits as they are forming. This disease makes its appearance in May, in the form of white spots upon the leaves. These gradually spread and cover the leaf-surfaces and extend to the fruit, covering it with white filaments, which may easily be mistaken for common mould. To casual observers the fungus appears to attack the fruit only as it approaches ripeness, when it spreads with astonishing rapidity; but this is due to the fact that it is not readily seen with the naked eye upon the fruit until the latter has coloured, for with the aid of a pocket lens it may be discovered upon the fruit in all stages. It is

however, most rapid and destructive in its action as the fruit approaches ripeness. As in the case of the allied hop-mildew, which "runs" with great rapidity in the hop cones as they approach maturity, the full virulence of the strawberry mildew is concentrated upon the ripening fruit, so that the latter is spoiled before it is fit to pick. It could not be ascertained that there were any special causes for the unusual attacks of this fungus during the past season, nor could they be traced to any particular methods of treatment. Plants on dry and damp soils seemed to suffer alike, and all kinds of strawberries were equally affected. Atmospheric conditions were not materially abnormal during the growth of the plants, except that there were some sharp alternations of temperature, and a period of drought, during which the development of the fruit was temporarily checked, followed by copious showers, causing quick growth.

This fungoid attack must not be confounded with that of the fungus termed *Sphaerella fragaria*, which is confined to the leaves, nor with that of *Glæosporium fragariæ*, of similar habit. These fungi appear in spots upon the leaves, and by their action upon them indirectly affect the production of fruit. As has been shown above, the *Sphærotheca pannosa* directly infects the fruit and makes it unfit for use.

Sphærotheca pannosa is a member of the family of fungi classified as *Erisypheæ*. The well-known species dreaded by hop-growers, *Sphærotheca* (*Podosphæra*) *castagnei*, is its close ally. Like the other members of the family of *Erisypheæ*, this fungus is parasitic upon the surfaces of the leaves and fruit of plants. It does not invade the stems, leaves, stalks, and fruit in the same way as the potato fungus, *Phytophthora infestans*, but its mycelium merely penetrates the cells of the epidermis from which it derives nourishment, thereby weakening and injuriously affecting the infected plants.

The life history of the fungus is comparatively clear. It commences with the spores of an ovoid shape liberated from the winter cases—*perithecia*—which have passed the winter upon parts of the plants, upon the ground, or upon other host plants of different species. This fungus is found also

upon rose trees, peach and apricot trees, and plants of various kinds. From the spore a white mycelium is formed, having many branches, and fastened by haustoria to the epidermis of the leaf. *Conidiophores*, as shown at A in the figure, are quickly formed, and from these, ovoid, unicellular *conidia*—spores—are evolved during the summer, and propagate the fungus with the aid of the wind, insects, and other agencies. Later on, *perithecia*, B, not so large as the smallest pin's head, having several filamentary or thread-like attachments, are formed upon the mycelium. These are light-coloured at first, gradually becoming black. Within these cases are several smaller cases, *asci* (C), containing six to eight spores. They do not come to maturity until the early spring, when the cases burst and the spores are distributed. The *perithecia* may be upon the plants, or they may fall to the ground, or they may be carried upon decayed leaves. Their preservation during the winter, and the evolution of the spores in the spring, depend upon weather influences, the situation of hibernation, and many other conditions; while their distribution after safe evolution, especially of those upon the ground, is by no means certain, and, fortunately, depends much upon circumstances. Unless there were many chances against the preservation and distribution of this fungus, as well as of many other injurious fungi, the consequence would be ruinous to cultivators.

In America strawberry growers sometimes mow the strawberry plants that are infected by other fungi, such as the *Sphaerella fragaria*, for instance, directly after the crop has been gathered, and carry the leaves away and burn them. In other cases the straw or litter put under the plants is set on fire and the leaves burned off. There may be some risk of killing or injuring the plants by this heroic treatment; but it has been adopted in bad cases in this country. It would be well to brush off the leaves of plants infected by *Sphaerotheca pannosa* as closely as possible without injuring the crowns, and to rake up and burn at once all the leaves and rubbish between the rows of plants. The ground between the rows should be well forked and hoed in the autumn and early spring, to bury the *perithecia*, and weeds

should be kept down, both in the beds and around their borders. After an attack in the previous year the plants should be sprayed early in the following season, before the blossom shows, with a weak Bordeaux mixture, composed of 4 lbs. of sulphate of copper and 3 lbs. of lime to 50 gallons of water, or with a composition of 2 lbs. of sulphide of potassium (liver of sulphur) to 50 gallons of water. In large plantations these compositions can be put on with the distributing machine used for spraying potatoes, and in small beds with a knapsack machine.

The spraying should be performed early, and repeated in about ten days. When white spots are seen upon the strawberry plants that have not been infected previously, spraying with either of the above compositions should be carried out at once.

AGRICULTURAL AND MISCELLANEOUS NOTES.

WAGES OF AGRICULTURAL LABOUR IN 1897.

A report* recently issued by the Labour Department of the Board of Trade contains information, compiled, as in the case of previous years, from returns furnished by the chairmen of Rural District Councils in England and Wales, as to the current rates of weekly cash wages in January and June, 1897, of ordinary agricultural labourers, exclusive of piece-work earnings, extra payments for hay and corn harvests, and of all extra allowances in cash and kind.

The returns do not include men exclusively engaged with the charge of animals, such as cattlemen, carters, horsemen, and shepherds, who are generally paid higher wages and obtain more perquisites; but it has been assumed for the purpose of calculation, as in previous reports, that where the predominant rates of wages of ordinary labourers have changed in a district, a similar change has taken place in the wages of all classes of agricultural labourers.

The particulars of Increases and Decreases in wages in England and Wales in the years 1895, 1896, and 1897 are summarised in the following table:—

—	Changes in 1897 as compared with 1896.		Changes in 1896 as compared with 1895.		Changes in 1895 as compared with 1894.	
	Total Number.	Increase (+) or Decrease (−) in Weekly Cash Wages.	Total Number.	Increase (+) or Decrease (−) in Weekly Cash Wages.	Total Number.	Increase (+) or Decrease (−) in Weekly Cash Wages.
		s. d.		s. d.		s. d.
Increases -	82,453	+ 0 7½	58,578	+ 0 8½	27,556	+ 0 6½
Decreases -	4,932	- 0 6	40,751	- 0 10	92,334	- 0 8¾
	87,385	+ 0 6½	99,329	+ 0 1	119,890	- 0 5¼

The number given (viz., 87,385) is the total of male agricultural labourers, farm servants, shepherds, horsekeepers, horsemen, teamsters, and carters in 1897, in the districts in which there was a change in the predominant rates of wages.

* Report and Statistical Tables relating to Changes in Rates of Wages and Hour of Labour in the United Kingdom in 1897. C.—8975. Price 1s. 2½d.

In addition to this number of labourers living in districts in which there was a change in the predominant rates of wages, there are those living in districts in which there was a change in either the maximum or minimum rate of the range of wages prevalent therein. It has not been found possible to treat these cases in a statistical form, but the number of labourers in districts in which the wages showed a tendency to increase in 1897 compared with 1896 was 55,850, and the number in districts in which the wages showed a tendency to decrease was 16,586.

It will be seen that in England and Wales there was an upward movement in wages in 1897 compared with 1896. The number of labourers in districts in which changes in the current rates of wages took place in 1897 was 87,385 compared with 99,329 in 1896; of this number 4,932 were in districts in which wages fell (compared with 40,751 in 1896); and 82,453 were in districts in which wages rose (compared with 58,578 in 1896).

The total net effect of the changes in 1897 was an increase of £2,411 per week, or 6½d. per head, compared with £383 in 1896, or a rise of 1d. per head. Calculated on the total number of agricultural labourers in England and Wales, the rise per head in 1897 amounts to ¾d. per week compared with a rise of ⅓d. per week in 1896, and a fall of ¾d. per week in 1895. (See note below.)

Note.—In the *Labour Gazette* for June last a statement was furnished of the rates of weekly cash wages, exclusive of piece work earnings, extra payments for hay harvest, and all extra allowances in cash and kind, paid to ordinary agricultural labourers in England, in June, 1898, compared with June, 1897. The general effect of this statement was to show that agricultural wages had risen, especially in the Eastern Counties. The changes which had taken place in the Poor Law Unions reported upon, are indicated in the following table :—

Districts.	No. of Poor Law Unions reported on	No. of Agricultural Labourers, in Unions in which there was the undermentioned rise in wages of agricultural labourers, compared with the summer of 1897.					Total
		No rise	1s. per week	1s. 6d. per week	2s. per week	2s. 6d. per week	
Midland Counties	54	52,489	14,660	—	1,396	—	68,545
Eastern Counties..	54	16,012	72,332	16,602	8,831	3,400	117,177
Home Counties ..	17	8,914	8,333	295	—	—	17,542
Southern & South-Western Counties	54	46,829	10,003	1,093	132	—	58,057
Total	179	124,244	105,328	17,990	10,359	3,400	261,321

It will be seen from this table that there was an upward movement in the rates of wages in the period referred to, and that out of a total of 261,321 agricultural labourers in the districts named, 137,077 (or 52 per cent.) had increases in their wages varying from 1s. to 2s. 6d. a week. Of these, 105,328 received a rise of 1s. a week 17,990, 1s. 6d. a week, 10,359, 2s. a week, and 3,400, 2s. 6d. a week.

By far the greater number of changes took place in the principal corn-growing counties, namely, in the Eastern and Midland Counties. Out of the 87,385 labourers in districts in England and Wales affected by changes, 58,078, or 66·5 per cent., lived in the Eastern and Midland Counties. Calculated on this number the aggregate rise amounted to £1,728 a week, equal to 7¼d. a head, compared with a rise in these counties amounting to £666 per week, or 2¼d. per head, calculated upon the 69,869 labourers in such districts as were affected by changes in 1896. The next group of counties in point of number of changes of wages was the Southern and Western group. In these counties 17,988 labourers were living in districts in which an increase of wages took place, the aggregate rise calculated upon this number amounting to £478 per week, equal to 6½d. per head, compared with a fall amounting to £340 per week, or 4d. per head, calculated upon the 20,901 labourers in such districts in these counties as were affected by changes in 1896.

In the Northern Counties of Northumberland, Cumberland, Durham, and Westmorland, 6,156 labourers were living in districts in which there was a rise, the increase calculated upon this number amounting to 5¾d. per head per week. In the counties of Yorkshire, Lancashire, and Cheshire, the rise was 8¾d. per head per week if calculated upon the 2,254 labourers living in the districts in which a change took place.

In Wales the wages were ascertained of the hired labourers (yearly or half-yearly) who are mostly single men, and who live and board in the farm-houses, and also of the married labourers who live in cottages, and whose wages are paid weekly, either entirely in cash, or partly in food. As it was found impossible to compute the number of hired men in the different classes who had been affected by changes, the changes of the married men were, as in former reports, assumed to apply to the hired labourers. In 1897, compared with 1896, the wages of labourers in Wales showed a very slight downward tendency, only 2,909 labourers living in districts in which there was a change, the decrease calculated upon this number amounting to £25 per week, or 2d. per head. In 1896, compared with 1895, no changes took

place except in those cases where a certain range of wages is prevalent, and where the change took place either in the maximum or minimum rate, and these were not treated in a statistical form.

In Scotland information was obtained from a number of employers of agricultural labour in each county, and also as to the rates of wages obtained at the principal hiring markets. The farm servants are nearly all hired yearly or half-yearly, and very few changes had taken place; where changes had been made they were not of sufficient importance to materially affect the wages of any particular class.

In Ireland information was received from each county with regard to wages of agricultural labourers, and no material changes were reported to have taken place.

EFFECTS ON BUTTER OF COTTON-SEED AND SESAME-SEED OILCAKE.

Experiments* on behalf of the Board of Agriculture have been undertaken during the present year by the South-Eastern Agricultural College, Wye, for the purpose of determining whether, and to what extent, the substances giving the analytical reactions for cottonseed and sesame oil might be found in the butter made from the milk of cows fed on cottonseed and sesame oilcakes. The following is a summary of the report by Dr. T. E. Thorpe, F.R.S., the principal chemist of the Government laboratories, on these experiments:—

Twelve Shorthorn cows were divided into three sets of four. Commencing on the 16th of February, 1898, all the cows were fed with the standard ration, consisting of 4 lbs. dried grains, 2 lbs. bean meal, 25 lbs. hay and chopped straw, and 40 lbs. of roots, together with 4 lbs. of linseed oilcake each per day. This feeding was continued till the 19th of March. Milk was taken at intervals of a day or two from each cow, and made into butter under the supervision

* A more detailed account of the experiments will be found in the "Annual Report on the Distribution of Grants for Agricultural Education and Research," 1897-8, issued by the Board of Agriculture. [C.—9061.]

of the Principal of Wye College. Samples of the butter were forwarded to the Government laboratory, where they were examined for the cottonseed and sesame oil reactions. The results of the tests were uniformly negative: and it having been established that none of the cows gave any indications of cottonseed or sesame reactions in the absence of the cake, the feeding with cotton and sesame cake was commenced. On the 19th March one-half the daily allowance of linseed oilcake was replaced by a similar amount of cottonseed oilcake in the case of the first set of cows (Nos. 1 to 4), and by sesame cake in the case of the second set (Nos. 7 to 10), the third set (Nos. 5 and 6, 11 and 12), being continued on the linseed cake as before for the purposes of comparison.

On the 20th of March samples were obtained from each cow as before. On the examination of the butter, the samples from the first set of cows (Nos. 1 to 4) gave a distinct reaction for cottonseed oil by both tests. No such reaction was given by any of the other samples, nor was any reaction for sesame oil given by the samples from any of the cows. Samples taken at intervals during this period gave similar results. On the 28th March the linseed cake was entirely replaced by cottonseed cake and sesame cake in the case of the first and second sets of cows respectively.

As no marked increase in the intensity of the cottonseed oil reaction was apparent at the end of the month's feeding on the normal ration of 4 lbs. of cake, the quantity, in the case of the first set of cows (Nos. 1 to 4) was gradually increased to 6 lbs., and then to 7 lbs. per day, which was found to be about the maximum amount the cows would eat. This feeding was continued till the 24th of May; but, even after more than two months' feeding with cotton-cake the results of the examination of the butter showed no decided or general increase in the cottonseed oil reaction.

The daily allowance of sesame cake was in a similar way increased to 7 lbs. (the cows would eat no more) in the case of cows Nos. 9 and 10, but no sesame oil reaction was obtained in any of the samples from these cows even at the end of two months.

On the 25th of May the cake feeding was discontinued,

and the cows turned out to grass. On the 26th May, and about every alternate day till the 17th of June, samples were taken from the first set of cows (Nos. 1 to 4), and the results of their examination showed that the cottonseed oil reactions persisted in a distinct form for about three days, and were distinguishable in the butter from three out of the four cows on the fifth day. At the end of a week it had disappeared from all.

In a number of samples the reactions given by the tests for cottonseed oil were carefully compared with those given by similar butterfats to which 1, 2, and 5 per cent. of four representative samples of commercial cottonseed oils had been added. From a comparison of the results of the tests, it was apparent that the strongest reactions from the samples from the cows fed on cottonseed cake did not much exceed that given by 1 per cent. of cottonseed oil added to butter, and the great majority of the samples gave reactions indicating less than 1 per cent.—reactions which would, indeed, be almost obscured in butter prepared and coloured in the ordinary manner.

On several occasions the Principal of the College prepared butter in the ordinary way from the mixed milks of the cows in the respective sets. The results of the examination of samples of these butters were similar to those from the individual cows, the intensity of the cottonseed oil reaction being midway between the weakest and strongest cows in the set. These butters were, however, uncoloured, and the reactions were consequently not obscured.

The general conclusions to be drawn from these experiments may be summed up as follows :—

1. Cows fed on cottonseed oilcake produce milk, the butterfat of which gives cottonseed oil reactions.
2. The reactions appear when the cows receive only a small quantity of cake. They increase somewhat with continuous feeding, but apparently cannot be carried beyond a certain point even when the amount of cake is increased to the full limit which the cows under ordinary circumstances care to eat.
3. The reacting substance passes into the milk within less

than twenty-four hours after the cake feeding begins, and continues to do so for several days after it has been dropped.

4. The reactions vary in intensity in individual cows, but do not in any case much exceed those given by 1 per cent. of cottonseed oil mixed with butter. The presumption is, therefore, that in butter made in the ordinary way from the mixed milks of several cows the reaction would as a rule be less than that due to the presence of 1 per cent. of the oil, and experiment shows that this is actually the case.

5. As feeding with cottonseed oilcake gives butter affording analytical data tending to differ from, rather than to approach to, those given by margarine, it appears to be possible in most cases to differentiate between the cottonseed oil reaction due to feeding on cottonseed oilcake and that produced by any considerable admixture of margarine containing cottonseed oil with butter.

6. The butter from the milk of cows fed on sesame oilcake gives no sesame oil reaction, even after more than two months continuous feeding up to as large a quantity as the cows will take.

Similar results have been obtained by other observers abroad.

EXPERIMENTS WITH BASIC SLAG ON CLAY LAND.

The last number of the Journal of the Bath and West of England Society contains an interesting abridged report by the Botanical Visitor of the Society upon the results of some experimental trials with basic slag upon poor clay land. These experiments were carried out on a number of sites upon the Digby Estate, in the neighbourhood of Sherborne, Dorset. The nature of the soil experimented upon in almost every case was such as would come under the denomination of poor, cold clay; and it was upon some of the poorest of these examples that the most marked results were produced. The manure was sown in March, 1895, upon half-acre plots, at the rate of 8 cwt. per acre. The severe drought of the summer of 1895 prevented any results being observed during that year, and as the season of 1896 also proved to be

an extremely dry one, there were practically no results worth noticing until the commencement of the present year.

The fact that the results only became strikingly apparent in the third year of the experiments points, the reporter thinks, to the following conclusions, viz.:—(1) On certain soils the full effects of basic slag are not apparent until a considerable period has elapsed; but (2) the development of these effects may be, and probably is, hastened or retarded by the condition of the season following the application of the manure; and (3) that it may perhaps be assumed that the beneficial effects of the slag are not only maintained over a very considerable period, but that there is also a marked tendency to increase observable in these effects from year to year, such as would seem to point to a gradual improvement in the general conditions of growth, and probably also to the production of a condition of food-availability in the soil which is specially favourable to the growth of leguminous plants.

The stimulation of the clovers and their allies would doubtless be accompanied by, if it did not exactly imply, a discouragement of the worthless weeds, such as has been observed in several of the sites. As regards the effect of the basic slag upon the grasses, the evidence at present derived from these experiments, and from those conducted by the Society, is held to be not quite so conclusive as in the case of the leguminous herbage; but it does not appear that the stimulation of clovers has been, in any case, at the expense of the better grasses of the pasture.

The following interesting notes by the Botanical Visitor relate to two or three of the more notable examples of these trials:—

Lillington.—The first field chosen for trial upon this farm has a stiff clay top-soil, resting upon the forest marble of the oolitic series, and is a typical example of the rough upland pasture met with in this neighbourhood. It is in great part overrun by brambles, and the soil is mainly held by such weeds as hawk's-beard, hoary rib-grass, or plantain (*Plantago media*), common bird's-foot, field daisy, carnation-grass, etc. A few grasses are present in varying propor-

tions; thus, dog's-tail is abundant, as is usual on such poor pastures, and fiorin (*Agrostis alba*, var. *stolonifera*) and hard fescue are both plentiful, whilst in lesser quantities there are cocksfoot and quake-grass. There is also a sparse growth of white clover. None of the better grasses, however, are in a flourishing state; the small amount of cocksfoot to be seen being very stunted. Large patches consisting entirely of carnation-grass and hoary plantain are met with all over the field.

This is the normal state of the herbage in the field, and its character sufficiently indicates the need for improvement as regards its feeding quality. In this respect the basic slag has brought about the most remarkable change. Upon the plot in question scarcely a plant of carnation-grass is now to be seen; the white clover has been greatly stimulated, and there is a very good bottom-growth, consisting chiefly of fiorin-grass. Cocksfoot seems to be distinctly benefited, for it has not only increased in numbers, but has assumed a much coarser growth. Another grass which seems to have been greatly encouraged is hard fescue. Hoary plantain, on the other hand, does not appear to be much affected by the altered conditions of growth; but the diminution of other weeds is most marked—though this is perhaps partly attributable to the preference shown by the stock for the herbage of this plot.

In another field upon this farm, having a similar soil, and with a herbage of somewhat similar character, the basic slag has worked an even greater change in the relative proportions of useful and worthless plants. The chief difference, however, in the two cases is the larger proportion of clover in the second field.

A third plot upon this farm is situated in a field having a rather steep slope, and characterised by a sparse herbage, with a profusion of ox-eye daisy, self-heal, and cudweed. Here the effect of the manure has been to bring on a very fine head of red clover, and to eliminate, to a great extent, the ox-eye daisy and some of the other weeds.

In the field adjoining the last, but occupying the crown of the hill, a fourth experiment has demonstrated the apparent

futility of applying basic slag to soils of a certain character. The clay of the lower field here gives place to a capping of sand upon the bottom rock, and consequently the soil loses its stiff, impervious character, and the results of the basic slag have here been almost nil. From this particular case, and also from others, it seems that special attention should be given to the nature of the sub-soil in deciding upon the advisability or otherwise of applying basic slag in a particular locality, and also in judging the comparative effects of the manure in different localities. It may frequently happen that in two contiguous fields the top-soil in the one case may have so thinned out as to bring the sub-soil (which is often, as in this case, the equivalent of the bottom-rock) nearer or close to the surface, and thus to alter materially the character and behaviour of the soil in reference to the action of the manure.

Stockbridge.—On this farm four separate experiments have been tried—two upon the Oxford clay, and two on the stiff, cold clay above the forest marble. The results have in all cases been very marked. One of the plots situated upon the Oxford clay afforded a very instructive example of the capabilities possessed by basic slag for improving poor soils of this character. The field in question, though on a gentle slope, and artificially drained, is normally wet, and after a few hours' rain is little better than a bog. The herbage is very scanty, the grasses consisting chiefly of fiorin and Yorkshire fog. With these are abundantly associated carnation-grass, field wood-rush, common rush, marsh cudweed, and buttercup. Moss is also exceedingly prevalent. Clovers are only sparsely represented. The field is one which has been allowed to go to grass, no seeds whatever having been sown upon it.

The effects of the dressing of basic slag are chiefly noticeable in the production of a good plant of clover, and the complete elimination of the carnation-grass, rush, and moss, with a marked reduction in the quantity of buttercup. The difference between the manured plot and the portion of the field adjoining it could be detected directly one stepped from the one to the other. The fiorin-grass and Yorkshire fog have

benefited to a large extent by the manure, and the bottom-growth, as compared with that of the rest of the field, is excellent. The fact that the normal herbage of the field does not include any grasses of good quality is sufficient to account for their absence from the manured plot.

The clovers specially stimulated by the basic slag were red and white clovers (especially the latter), and yellow suckling. Except in one instance it did not appear that the basic slag had promoted the growth of the grasses to an equal extent with the clovers, but rather that it had supplied the necessary stimulus which was lacking in order to enable the clover plant to displace the worthless weeds of the pasture, and thus to convert a portion of the poor clay pasturage, characterised by thin, wiry, and weedy herbage, into a comparatively rich feeding ground.

Experiments, of a more or less similar character to the above, in the application of basic slag to grass land have also been carried out in different parts of the country by some of the Agricultural Colleges receiving grants from the Board of Agriculture. Particulars of the results of these experiments will be found in the Report upon the Distribution of Grants for Agricultural Education and Research for 1897-98. (C. 9,061.)

FARM ANIMALS IN THE UNITED STATES.

The statistics of the number and value of the farm animals in the United States on the 1st January, 1898, are given in the Year Book of the Department of Agriculture. The numbers of horses, cows, other cattle, and swine, which have been decreasing for some years past, show a further diminution. The average value, however, of all classes of farm animals was higher in 1898 than in the preceding year. The number of cattle, other than milch cows, in the United States was returned at 29,264,197. The number is lower than in any year since 1884, and is nearly eight and a half millions below the return of 1892, when 37,651,239 cattle were reported. The average value per head on the farm was estimated at 87s., as compared with 69s. in 1897; the farm price has not

touched 87s. since 1886. The number of sheep has slightly increased since last year, when it was lower than at any time in the previous eighteen years. The number given for 1898 is 37,656,960 at an average price of 10s. 3d., as compared with 7s. 7d. on the same date in the previous year. The number of swine, which has been steadily decreasing during the past five years, shows a further decline to 39,759,993. The following table shows the number and average value of the farm animals, except horses and mules, in the United States at intervals during the past twenty years :—

Year.	Milch cows.		Cattle, other than milch cows.		Sheep.		Swine.	
	Number.	Price per head.	Number.	Price.	Number.	Price.	Number.	Price.
		<i>s. d.</i>		<i>s. d.</i>		<i>s. d.</i>		<i>s. d.</i>
1879	11,826,400	90 6	21,408,100	64 1	38,123,800	8 7	34,766,100	13 3
1883	13,125,685	125 10	28,046,077	90 10	49,237,291	10 6	43,270,086	28 1
1888	14,856,414	102 8	34,378,363	74 1	43,544,755	8 6	44,346,525	20 9
1893	16,424,087	90 7	35,954,196	63 6	47,273,553	11 1	46,094,807	26 8
1897	15,941,727	96 6	30,508,408	69 4	36,818,643	7 7	40,600,276	17 0
1898	15,840,886	114 4	29,264,197	87 2	37,656,960	10 3	39,759,993	18 3

BEET SUGAR INDUSTRY IN THE UNITED STATES.

Numerous experiments in the cultivation of sugar beet have for some time past been undertaken in the United States with a view to ascertaining how far the sugar imported from abroad can be produced within the country. The United States Department of Agriculture has lately published the reports of its special agent, Mr. Charles F. Saylor, who was charged with the investigation of the industry in 1897.

From this report it appears that the imports of sugar now amount in value to over £20,000,000 annually, and Mr. Saylor expects that the United States will before long be able not only to manufacture the whole of this quantity from its own beets, but also to offer its sugar to other countries at a profit. The sugar beet industry has only existed for about eight years in the few factories as yet established in the

United States, but many improvements have already been introduced both into the machinery of the factory and the methods of cultivating the roots.

From the experience chiefly of European countries the United States Department of Agriculture has come to the conclusion that, so far as temperature only is concerned, the most suitable climate for sugar-beet to attain its perfection is one where the mean summer temperature (*i.e.*, during the months of June, July, and August) is about 70 deg. Fahr. This condition is found in North America in a belt of about 200 miles in width, extending in a westerly direction from the State of New York, across the continent as far as the Rocky Mountains, and then turning south to the Mexican frontier, while nearly all the country to the west of the Rockies is also within this temperature zone. It is this belt which is known as the theoretical sugar-beet zone of the United States, although it is to be understood that other conditions, such as those of soil, rainfall, etc., may render parts of it unsuitable for beet culture; and, on the other hand, other circumstances may render the plant profitable in some localities outside the zone. In this connection it may be noticed that a deficient rainfall does not appear to be necessarily detrimental to beet cultivation, as in some of the more arid districts irrigation is freely employed, and, it is said, with success. Two of the factories (in New Mexico and Utah) secure their beets entirely through irrigation. It has, however, been noticed that in some sections where irrigation is common the beets are subject to a disease, although it cannot be said with certainty that irrigation is the cause.

The experiments conducted by the Department of Agriculture have consisted in the distribution of some seven tons of beet-seed to farmers willing to grow the plant on experimental plots; the beets grown are tested for sugar contents and purity, and then a study is made of soil, moisture, and climate. Some twenty-eight States participated in the experiment. Instructions as to the proper method of cultivating the beet were also supplied by the Department; but it would appear that these were not always adhered to, as

the farmers did not in every case realise the necessity of following carefully the instructions laid down, or of devoting as much labour and attention as this crop requires. Nor were the plots selected always typical of the district, the farmer often allotting to the experiment any odd corner of land remaining over after he had sown his usual crops.

Among the advantages claimed for America in the cultivation of this crop are the fertility of the soil, which, owing to its comparatively unexhausted condition, requires no manure—at least, in the more recently settled districts. Apart, also, from the market for the inland sugar producer being close at hand, as compared with his European competitor (especially as much of the country near the great lakes appears suitable for beets), he is also favoured by the Customs tariff, which has been designed to counteract the bounties given in Europe. The duty at present in force is 95 cents per 100 lbs. (4s. 5d. per cwt.) on raw sugar not above 16 Dutch standard in colour and not above 75 degrees polarisation. Above this degree an additional 3·5 cents per 100 lbs. is charged for each additional degree of polarisation, until the duty reaches 182·5 cents per 100 lbs. (8s. 6d. per cwt.) on refined sugar of 100 degrees polarisation. When the sugar is higher in colour than 16 Dutch standard, a further 12·5 cents per 100 lbs. is added to the duty.

The value of a crop of beets varies in different districts, and much depends upon the sugar contents. Some of the factories require that the beets shall contain 12 per cent. of sugar, and show a purity coefficient of 80 per cent. Beets lower than this standard are rejected or docked. Some other factories pay according to the sugar contents, the price increasing materially for high percentages of sugar. As the percentage of sugar is usually higher in beets of small size, it follows that it does not pay the farmer to grow too heavy a crop, as in the large roots the sugar percentage and purity is usually low, so that the factories would either reject the roots altogether or pay only a very small price for them. Some States grant a bounty of about 4s. 2d. per ton, paid either direct to the farmer, or else to the factory conditionally upon the latter paying the farmer a certain price for his beets. An

estimate of the profits from beet cultivation is given for a farm in Utah. The expenses are put at £6 19s. per acre; this sum including the cost of all labour and field operations, with three miles haulage of the produce, but no allowance is made for rent, nor does there appear to have been any outlay on manures. The receipts for 13 tons of beets at 4 dols. (16s. 8d.) per ton, which was the price paid by the factory, amounted to £10 16s. 8d., thus showing a profit of about £3 17s. 8d. per acre.

At the date of Mr. Saylor's report, there were nine beet-sugar factories in operation in the United States, viz., one in the New York State, two in Nebraska, one in Utah, one in New Mexico, and four in California; while others were in the course of construction or proposed in various States. The capacity of these factories ranges from about 300 to 1,100 tons a day, but it is intended that some of the new ones shall be larger.

During the investigations of the year certain questions relating to the industry were asked of the managers and experts of the factories. From the answers received it appears that the factories pay from 14s. 7d. to 18s. 9d. per ton for the beets. The rent of sugar-beet land varies considerably: in Nebraska it was put at 16s. 8d. to 25s. per acre, but in other districts it ran as high as 40s. to 80s., while in some localities the farmers paid a fourth or a fifth of the crop. There appears to be considerable demand for the pulp for cattle-feeding near some of the factories, especially for creameries; one factory stated that it got 5d. a ton for the pulp, while another sold it at 2s. As regards the molasses, some of the factories throw it away, others adopt certain processes for extracting some of the sugar, and one sells it at $\frac{1}{2}$ d. or $\frac{3}{4}$ d. per gallon, to be used in the manufacture of alcohol. All the factories estimated the cost of making beet-sugar ready for the market at about $1\frac{1}{2}$ d. or $1\frac{3}{4}$ d. per pound, the highest quotation given being 15s. 5d. per 100 lbs.

BEET SUGAR INDUSTRY IN RUSSIA.

The Foreign Office have recently published a report by Mr. Consul H. Smith on the beetroot sugar industry in Russia from its first introduction in 1800 to the present time. In this report Mr. Smith states that the production of sugar from beetroot was first taken up in Russia, not by a chemist, or anyone having special training, but by a landed proprietor, Major-General Blackennagel, who in 1800 built the first factory for producing sugar from beetroot on his estate in the province of Tula. Until the year 1809 this was the only factory in Russia, but seven or eight were built about this time, and between 1830-40 there were over 600 factories at work in the country. It is worthy of note that these factories were built in the provinces of Tula, Kaluga, Orel, Tambow, Smolensk, Grodno, Mohilew, and Kursk, and it was only about the year 1840 that the industry began to force its way into the southern provinces, where it has developed with such strides as to have become one of the leading industries of Russia.

Up to the year 1860, the factories were mostly built and owned by the landed proprietors; but after the freedom of the serfs, private firms, and more largely joint stock companies, took up the trade, and in many cases purchased the factories owned by the magnates.

In the year 1848 the number of factories was 380, and the production of sugar was 19,272 tons. Twenty years later the number of factories had declined to 300, but the total production was 110,334 tons, and by the year 1891 over four times this quantity was manufactured in 225 factories. The production for 1897-98 is put at 754,758 tons. This advance in production is largely due to the increase in the quantity of sugar which can be extracted from a given quantity of beetroot, an increase due not only to the improvement of the machinery used in the trade but also to the scientific cultivation of the beetroot. In the early years of the industry, only half-a-pound of sugar was extracted from about 4 cwts. of roots; in the year 1830, this had increased to 6 lbs., and in 1863 to 22 lbs. Since that date the production has been more than doubled and is put at $44\frac{1}{2}$ lbs. for the current season. The area of land under beetroot cultivation in the

Empire was not properly ascertained until the year 1881-82, when it was found to be 641,113 acres. In 1896-97 the extent of land under this crop was estimated at 869,881 acres.

In 1848 the Government imposed an excise duty upon the quantity of sugar produced, and the fixing of this duty was more or less complicated until 1881. In 1881-82 the complicated system was entirely abandoned and duty was payable upon the quantity of sugar produced, irrespective of the productive power of the factory. This method has since been maintained, and in 1894 the duty was fixed at 1 r. 75 c. per poud (10s. 11d. per cwt.), at which rate it remains. Details as to the present system of fixing the excise duty are given in the last number of this Journal.

The imports of sugar into Russia are usually insignificant, the quantity in the period 1870-93 being 85,182 tons, two-thirds of which were imported in the two years 1875 and 1893. The duty is 37s. 5d. per cwt. on soft, and 38s. 5d. per cwt. on refined sugar. The total exports of sugar have averaged 88,561 tons during the ten years 1887-88 to 1896-97, but in the year 1895-96 no less than 178,605 tons were exported.

The *Bulletin Russe* for April-June, 1898, contains a table showing the production and consumption of sugar in Russia since 1872. In this table the consumption is taken to be the quantity of sugar sold on the national markets. The figures, converted into English equivalents, are for the last five years as follows:—

Years.	Stocks at the commencement of the season.	Imports.	Production.	Total.	Quantity sold.	Exports.
	<i>cwts.</i>	<i>cwts.</i>	<i>cwts.</i>	<i>cwts.</i>	<i>cwts.</i>	<i>cwts.</i>
1892-93 -	425,000	547,000	7,850,000	8,822,000	7,899,000	427,000
1893-94 -	501,000	6,000	11,487,000	11,994,000	9,528,000	1,657,000
1894-95 -	809,000	4,000	11,241,000	12,045,000	8,569,000	1,677,000
1895-96 -	1,805,000	5,000	12,794,000	14,604,000	8,766,000	3,570,000
1896-97 -	2,275,000	9,000	12,497,000	14,781,000	9,809,000	2,383,000

The above figures show that the reserve of sugar has increased in Russia since 1892, and that the stock at the beginning of 1897-98 stood at approximately 2,500,000 cwts., a higher figure than in any previous year.

LIVE STOCK IN GUATEMALA.

In his annual report to the Foreign Office on the trade of Guatemala, Mr. Consul Trayner furnishes some interesting information relative to dairy-farming and live stock in that country. It appears that the dairy stock consists largely of three-quarters or half-bred natives and Holsteins. The pure-bred native cows give much richer milk than the imported stock, but yield very little, while the milk of the thorough-bred imported cows is said to be very thin, owing no doubt largely to the unsuitable nature of the fodder, and thus the half-bred cows are the most profitable.

There are large tracts of land in the high plateaux of the Republic which, though incapable of bearing good crops, yield very fair grazing for cattle all the year round. The climate is mild and equable, and the cattle can remain in the pastures from January till December, while no losses are suffered from severe weather in winter, snow being quite unknown. Most of the country is well watered. The total number of head of cattle in the country was estimated in 1895 to be about 500,000, but this number is being rapidly augmented and the breed improved. The price of cattle varies considerably: a calf fetches from 8 dols. to 15 dols. (13s. to 24s.), a bull from 20 dols. to 40 dols. (32s. to £3 4s.), an ox from 25 dols. to 50 dols. (£2 to £4), and a cow from 15 dols. to 30 dols. (25s. to £2 10s.). The price depends much on the breed; a good cow sometimes brings 70 dols., and imported stock fetch larger prices all round.

According to the last census returns there are about 62,000 head of horses and 42,000 mules in Guatemala. For some years past, it appears, the race of horses has been improved by the importation of stallions and mares from the United States, and from Chili and Peru, while a few animals of English and Arab stock have also been introduced. This mixture of new blood is said to have produced an excellent race of horses, some being of great value. The native horse, though small in height, possesses great endurance, and can make extraordinarily long journeys, although, as a rule, his fodder is of the poorest kind of hay and dried maize leaves.

The average price at this time for a native horse runs from 150 dols. to 400 dols. (£12 to £32), though some fetch as much as 600 dols. or 700 dols., while imported stock often bring from 1,000 to 2,000 dols. (£80 to £160). The mules are particularly fine, and are far superior to the horses for long journeys or heavy loads; they are also, as a rule, higher priced than the native horses, and cost from 200 dols. to 1,000 dols. (£16 to £80).

There are considerable numbers of sheep and pigs raised, but the former are poor and small, and provide neither particularly good mutton nor good wool; swine, however, are raised in large numbers and fetch a high price, 10 dols. (16s.) often being given for a quite small hog, while a large and fat one commands about 25 dols. (£2). Pork, it appears, is one of the favourite foods of the native, and the large demand for it, and the cheapness of feeding the live stock on nourishing roots, acorns, and maize, ensures a satisfactory profit to the breeder.

[*Foreign Office Report, Annual Series. No. 2,139. Price 2½d.*]

THE DANISH HARVEST IN 1897.

The harvest in Denmark in 1897 was a small one, and medium crops only were obtained, but as prices ruled high the result was satisfactory. Wheat gave the best return, and the yield was heavy and over the average. Rye did not give such a good return, as it suffered considerably from frost and rust disease, and was not harvested in good condition. Barley and oats gave the poorest yields obtained for many years, owing to unfavourable weather and disease. Mixed seeds, beets, and potatoes did fairly well, whilst hay gave a very good return, and was cut and stacked in splendid condition. Beans, peas, and buckwheat were an average crop.

The gross value of the harvest in 1897 for the whole country is calculated to have been about £17,770,000, viz., £9,000,000 for the islands and £8,770,000 for Jutland. When compared with the harvest of 1896, which amounted to £16,474,000, an increase is shown of £1,296,000. Compared with the average

of the previous five years there was an increase in 1897 of £1,100,000. The quantity of all crops was smaller in 1897 than in 1896, and also smaller than the average for the foregoing five years, so that the increase in value was due to higher prices, the only crops that were larger in 1897 compared with previous years being sugar-beets, buckwheat, and hay.

The yield of the principal crops in 1897 was as follows : Wheat, 3,344,000 bushels ; rye, 17,437,000 bushels ; barley, 18,453,000 bushels ; oats, 33,900,000 bushels ; potatoes, 19,416,000 bushels ; beetroots, 7,657,000 cwts. ; red beets, 57,603,000 bushels ; fodder beets, 61,778,000 bushels ; clover, 1,828,000 lasts (of 1,100 lbs.) ; hay, 1,212,000 lasts.

[*Foreign Office Report, Annual Series, No. 2, 1911. Price 3½d.*]

AGRICULTURAL STATISTICS OF INDIA.

The Board have received from the Department of Revenue and Agriculture of India a volume containing the complete agricultural statistics of India for 1896-97, with comparative figures for earlier years. The principal crops are compared in the following table with those of the year 1894-95.

Crops.	1894-95. Acres.	1896-97. Acres.
Rice - - - - -	69,280,303	66,234,485
Wheat - - - - -	22,761,308	16,183,987
Barley - - - - -	7,189,420	6,341,102
Maize - - - - -	5,055,971	5,776,965
Other grains - - - - -	77,288,627	66,119,477
Total food grains - - - - -	181,575,629	160,656,016
Sugar - - - - -	2,889,230	2,789,213
Other food crops (fruit, vegetables, &c. - - - - -	5,567,097	6,017,127
Oilseeds - - - - -	13,929,969	10,531,864
Fibres - - - - -	12,540,600	12,275,943
Dye plants - - - - -	1,740,509	1,609,635
Opium - - - - -	542,633	601,405
Coffee - - - - -	133,629	147,158
Tea - - - - -	414,398	423,732
Tobacco - - - - -	1,174,581	1,000,230
Fodder crops - - - - -	1,931,713	2,057,563

In 1896-97 the total net area of India by professional survey, deducting feudatory and tributary states and areas for which no returns exist, was 537,011,000 acres. The area under forest was 63,970,000 acres, and 153,895,000 acres were returned as not available for cultivation. The area of land, nearly 47 million acres, which was left fallow, was greater by about ten million acres than the fallow of 1895-96, which was itself above the average of previous years, and the acreage from which crops were taken was diminished to about the same extent. The areas which are returned under the various crops are the gross cultivated area under each crop, irrespective of irrigation and double cropping. The total area under food-grains is lower than in any year since 1890-91, previous to which date the statistics are not in all respects comparable.

The total number of cattle of all kinds in India, including Mysore, is in round figures 80 millions. Sheep amount to 18,660,000; goats to 15,912,000; horses to 1,144,000; and mules and donkeys to 1,169,000. These figures exclude Bengal, for which no returns exist; it is estimated, however, that there are in that Presidency 25,000,000 cattle, 6,000,000 sheep and goats, and 300,000 horses, ponies, mules, and donkeys.

AGRICULTURE IN TRIPOLI.

In a Foreign Office Report on the trade of the Vilayet of Tripoli, Mr. Consul-General Jago says that the methods employed in agriculture in Tripoli are those which have prevailed since the earliest times, and no attempts have ever been made to introduce modern implements of any kind. Ploughing is done by means of camels and oxen, the seed is thrown broadcast, and the rest left to nature. In the neighbourhood of Tripoli and other towns irrigation from wells is extensively practised; but elsewhere the success of cereal crops depends on the rainfall during the wet season, which lasts from the beginning of November to the end of March, little or no rain falling in other months, and in no

way influencing the harvests. The equality of distribution is, unfortunately, so precarious that during a period of ten years four good harvests can alone be calculated upon, the rest being total or partial failures owing to the absence of the necessary rains in January to March.

Barley is the chief crop, and is the one on which the prosperity of the country for the time being wholly depends. When good rains at opportune times produce a surplus crop, say four years out of ten, barley to the value of £50,000 to £60,000 is exported, almost all to England, where it is used for malting purposes. In years of drought and scarcity, unfortunately too frequent, large quantities have to be imported to provide breadstuffs for the agricultural population and seed for sowing, and the Consul states that during the last twelve years barley to the value of £249,680 was imported, while exports only reached the value of £211,000, thus showing the inability of the country to grow enough for its yearly wants, taking one year with another.

The production of wheat has greatly diminished of late years, and the area now sown is barely one-tenth of that of barley, owing to the restricted area of soil adapted for its cultivation, to the comparative small margin between local values of wheat and barley, and to the large importations from Marseilles and Genoa of semolina and flour, which supply almost the entire wants of the urban population, who alone are consumers of wheaten flour. The average value of such imports during the past ten years has been £31,000 yearly.

The exports of cattle, all of which go to Malta, are increasing, having averaged in value during the past eight years, £28,300. During 1896 and 1897 the values were £40,000, and £36,000 respectively. Sheep are not exported except in times of great drought and consequent want of pasturage. Some years ago two successive rainless years nearly extinguished the flocks.

[*Foreign Office Report. Annual Series. No. 2125. Price 1½d.*]

HORSE BREEDING IN ITALY.

The Board have received, through the Foreign Office, a report prepared by Mr. E. Neville-Rolfe, Her Majesty's Consul at Naples, relating to the breeding of horses and mules in Italy.

Mr. Neville-Rolfe states that scientific or rational horse-breeding is much more advanced in the northern half of the kingdom than in the south. In the northern portion, and as far as Rome, cart-horses worthy of the name may be seen in fair quantities, whereas to the south of the capital such horses do not exist, and the traction of a furniture van presents a problem. At Rome it will be drawn to the station by a pair of horses: on arrival at Naples it is drawn by a heterogeneous collection of animals, often consisting of two cows, a donkey, and a pony or two.

In the north of Italy cart-horses are bred from Norman, Flemish, and English sires. They are usually of the Percheron type. In southern Italy there seems to be no notion of scientific horse breeding or crossing, the fallacy that a degenerate breed will be in every case improved by a thoroughbred cross is still rampant, with the result that the animals cast by the little native mares from thoroughbred sires are wretched weeds. The good breeds which existed there only a few years ago have degenerated, especially those of the neighbourhood of Salerno, such as the Moschetti, Farina, and Composti. They still, however, and especially the Farina breed, turn out some good stock. These horses have good shoulders and chests, but are somewhat long in the back and have sloping quarters; they are, therefore, more suited for carriage than for saddle work, and correspond to the Hackney class in England. Their bone and sinews are remarkably good and strong, as are also their hoofs. A good five-year-old Salerno is worth from £30 to £60. In Calabria the Baracco breed still stands in good repute. These horses are sturdy and sure-footed, though somewhat small.

The great obstacle to breeding horses in Italy is the want of a remunerative market; the only sure and large purchaser

is the Government, which requires a supply for military remounts. But the Government expects four-year-old horses at £25 to £30, a price which does not cover the cost of production. By the time the mare has been kept one year, and the colt four, there cannot be any margin of profit, even when, as is always the case in Italy, the horses are bred on waste lands, such as the marshy plains of the Maremma and the Roman Campagna. Within the last few years some of the large Italian land-owners have imported English and Irish brood mares, with the intention of crossing them with the thoroughbred Government stallions, and breeding good cavalry horses. In order, however, to make such breeding profitable, an average of £60 a colt is required—a price which the Government will not give, and which is not easy to obtain, even for officers' chargers.

The horses bred in the Maremma and Pontine marshes are a very good type of troop-horse. They are sturdy and very hardy; indeed, it is said that in the Crimean war they bore cold and privation better than any other horses engaged in the campaign.

Italy is eminently a cultivated country, and horses can only be bred to pay on an extensive scale on such marshy and waste lands as are not utilised for cultivation. As these waste lands are being rapidly drained and brought under cultivation, the area used for horse-breeding constantly diminishes, and many owners give up their business, or are satisfied to let the remnants of their old breeds go on as best they can. This abandonment of the breeding has also caused a deterioration in the quality. There are two further important causes of the decline in quality. The first is the system of looking for immediate instead of future profit. The horse-breeder presents all his beasts—stallions, mares, and geldings—to the Army Remount Commission, which naturally picks out the best animals, and the breeder goes on breeding from the remainder, so that by eliminating the good material, and breeding from the bad, the stock gets worse and worse. The second cause is that although the Government goes to considerable trouble and expense to buy good stallions at home and abroad, and lets them out at very low prices, the custom

of leaving the majority of horses entire causes the proprietor of a few mares, either to save the small cost of the Government stallion, or simply from carelessness, to permit his mares to be served by the first entire horse that comes to hand ; or even if he uses a Government stallion, he takes the one nearest him, without making any rational or scientific selection.

The Government does not breed horses, although it had formerly a stud farm at Persano, which once had a considerable reputation for military horses ; there is still a stallion and remount dépôt there. There is a Royal stud at San Rossore, near Pisa, the only one remaining of several which were formerly kept up by the king at great expense ; this contains both oriental and thoroughbred sires, which supply the royal stables, the surplus being sold, chiefly as chargers to officers.

Breeding is thus left to private individuals, but the Government renders assistance by providing dépôts of stallions, where owners can bring their mares to be served. The most important Government stallion dépôts north of Rome are at Cremona, Ferrara, and Reggio d'Emilia for cart-horses, and at Pisa for thoroughbreds ; in the south there are dépôts at Santa Maria di Capua Vetere, and in Sicily at Catania and Ozieri.

At the beginning of 1897 the Italian Government owned 557 stallions ; at the end of the year the number was 512, of which 61 were English thoroughbreds and 52 Arabs. Of these some were purchased in Italy ; the roadsters came from England, the hunters from Ireland, the draught horses from eastern Prussia (Trakehnen breed), Belgium, and the Ardennes, while the Arab sires were purchased from the Government stud at Babolna, in Hungary.

The management of the stallions is entirely in the hands of the military authorities, and the total cost of maintenance of the dépôts last year was £1,423, of which three-quarters is paid by the provinces and one-quarter by the communes. The total expenses for each stallion averaged about 4s. per day.

These sires covered 21,617 mares, or an average of a little over 39 each, during the year, standing at 370 stations. This

average of 39 is, however, very deceptive, as the ordinary stallions, for which the fee is only 12 lire (under 10s.), served no less than 20,583 mares; whereas in the first category of sires (fee 19s.) only nine mares were served, 167 mares were refused on account of under-size, quality, unsoundness, or vice. The total receipts realised from service were £11,409. More mares were brought to the Government stallions in 1897 than ever before, while, from want of funds to replace losses of stallions from various causes, the number of these decreased.

Besides the horses belonging to the Government, stallions belonging to private individuals can obtain official approval. Of such there were 694 approved in 1897.

As already stated, the only regular and important market for the breeder of the ordinary class of horse on a large scale is the Army Remount Commission. For several years the Government bought largely in Hungary, and the army is still mounted to a great extent largely on Hungarian horses. For the last few years, with a view to encouraging horse-breeding in Italy, the Government has made a point of purchasing only at home, but it would appear that up to the present this practice has not proved very successful. On the other hand, the breeders complain that the price is not remunerative, and that it is therefore not worth while to go to any expense to improve the breed. And, on the other hand, the Army Remount Commission complain that they have great difficulty in finding the required number of horses of sufficiently good quality, and that to complete the requisite number they must (towards the close of the buying season) pass horses which are not up to the official standard.

For the army remounts, Italy is divided into several districts, in each of which a Remount Commission (composed of a colonel, a captain, and a couple of veterinary surgeons) travels about to examine and pass the horses presented for inspection and sale. This is done in May and June. The selected horses are then sent to the Remount dépôts, whence they are drafted off to the regiments as required. They are mostly unbroken.

The officers are chiefly mounted on Irish horses of the

hunter class. The Government sends a commission over to Ireland once or twice a year to buy a certain number (dependent upon the state of the finances) of five-year-old, half-bred horses, at an average of £60 to £70. These horses when brought to Italy are sold to officers at cost price. The principal private horse-dealers also import some British horses.

Mules are bred on a large scale all over South Italy, viz., in the Abruzzi, Puglia, Basilicata, Calabria, and Sicily. In these mountainous districts, and even in the plains of Puglia, most of the agricultural field work, and nearly all the transport, is performed by mules in preference to oxen or other modes of traction.

The principal seat of mule-breeding (as regards both quantity and quality) are the Abruzzi, and more particularly around Solmona. Land-owners and peasants go in for mule-breeding, as it is a paying business. Most of the Abruzzi mules are sold in the Foggia market, where there are important fairs in May and November.

The best known donkey stallions were at one time those of the Island of Pantellaria (between Sicily and Africa); but now the best come from the neighbourhood of Taranto. They are even exported abroad, some having been lately purchased for Hungary and Russia. A good stallion may fetch as much as £60.

IRISH AGRICULTURAL CO-OPERATIVE SOCIETIES.

According to the fourth annual report of the Irish Agricultural Organisation Society the number of agricultural co-operative societies existing in Ireland on the 31st March last was 243, with a membership of 27,322. These comprised 123 dairy societies, 13 auxiliaries, 77 agricultural societies, 15 agricultural banks, 13 miscellaneous societies, and 2 federations.

Of the dairy societies or creameries, which have a total membership of 16,333, 54 are situated in Munster, 38 in Ulster, 20 in Connaught, and 11 in Leinster.

There is stated to have been an increase in the number of "auxiliary" dairy societies, particularly in the north and west. In the majority of cases the "auxiliary" is an independently registered society, and is affiliated with another society for purposes of churning only. The affiliation is effected by the auxiliary society taking a certain number of shares in the central society, whereby it becomes a member and participates in the profits. In other cases the auxiliary is merely a branch or part of the parent society in which its milk suppliers are shareholders, and enjoy equal rights and privileges with the suppliers to the parent creamery. Nearly all the new creameries are being equipped with pasteurising plant.

The total sales of butter effected by 72 of the dairy societies, from which information was furnished on this point, amounted in 1897 to £334,711, and other produce was sold to the value of £19,213. The average price paid to members for milk supplied during the year was 3'6*d.* per gallon, and the average price realised per lb. for the butter sold was 9'8*d.*

The agricultural societies, of which there are 77, generally confine their operations to the purchase of farming requisites for their members; but some of them have made considerable sales of live stock. These societies have also been useful in procuring large numbers of spraying machines, which are hired out to the members at a small charge, thus bringing within the reach of the poorest what would otherwise have been too costly a means of checking potato disease.

Fifteen agricultural banks have been started on the Raiffeisen system, but twelve of them did not commence operations until 1898. Returns furnished by the three older banks show that the number of loans granted in 1897 was 124, the sums lent amounting in the aggregate to £475 the average loan was therefore nearly £4. The Irish Agricultural Organisation Society attach very great importance to the introduction of the Raiffeisen system into Ireland and are inclined to put it in the forefront of their propaganda. In 1897 the Congested Districts Board, Ireland, made a grant of £100 to the Society in aid of the expenses of organising

agricultural banks in congested districts. The Board has also voted a sum of £2,000 to be lent out in sums of £50 to agricultural banks in congested districts.

Co-operative poultry societies⁷ have been established in three localities and several of the existing agricultural societies have also taken up this branch of business. In the first instance it has been decided to confine their operations to the sale of eggs, as it is considered to be the more important branch of the industry and presents less difficulties than the fattening and sale of table fowls. It is expected that the poultry and egg industry will, by means of these societies, be materially developed and improved during the current year, especially in poor and congested districts. By the rules of the co-operative poultry associations the eggs must be delivered fresh and clean; they are purchased by weight, properly sorted and packed, and the supplies are, as in the case of dairies, paid for in cash according to the quality of the eggs delivered, any profit arising from the business being divided amongst the members.

The other societies embraced under the heading "Miscellaneous" include two pig-feeders' associations and five societies for the development of home industries.

AGRICULTURAL LABOUR IN JULY.

The agricultural correspondent to the Labour Department of the Board of Trade, in his monthly report on agricultural labour, which is based on 250 returns from various parts of the country, stated that, generally speaking, agricultural labourers were very regularly employed during July, getting in the hay crop and also at hoeing. The weather during the month was very favourable for outdoor employment. In the Western Counties harvest began during the last week of July, and at the end of July oats had begun to be cut in some of the Eastern and Home Counties. Reports from all parts of the country showed that the corn crops were generally heavy, but that they were a good deal laid in

many districts, thus necessitating a good deal of cutting by hand instead of by machine.

The dry weather during July is said to have been injurious to the root crops in some parts of the Western Counties, and consequently much labour for hoeing was not required. In other parts of the country the root crops were described as good. Reports frequently stated that it had often been very difficult, if not impossible, to obtain sufficient labour for hoeing, and also for hay harvest, and a number of employers intimated that higher prices had been paid for piece-work this year than in 1897. In certain districts in Wiltshire and Somersetshire men returned to their homes from the collieries in South Wales, owing to the strike, and got employment at farm work.

MISCELLANEOUS AGRICULTURAL IMPORTS AND EXPORTS.

In the Annual Statement of Trade of the United Kingdom for 1897, the Commissioners of Customs state that a record was kept in 1897 of the descriptions of articles comprised under the heading of "Goods unenumerated," and they give a list of these articles together with their values. Among the unmanufactured goods of more direct interest to agriculturists which have been imported, it may be noted that egg yolk and liquid egg figured to the value of £7,043. Cut and everlasting flowers amounted to a value of £212,819; the re-exports of the latter goods amounting to £7,545. Teazles, for dressing cloth, were imported to the value of £9,911, and willows for basket work, etc., to the amount of £40,772.

Amongst the manufactured goods imported the largest item was basket-ware, which was entered to the amount of £237,599; the re-exports of basket-ware being estimated at £4,911, whilst the exports of this article of British manufacture amounted to £12,781. Dextrine was imported to the value of £14,022, and fruit juice to the value of £98,072. The re-exports of these two commodities are returned at £1,778 and £2,567 respectively.

Amongst the exports included under the heading of goods

unenumerated may be noted oilseed cake and other animal foods (£88,501), straw-plaiting (£73,102), and yeast (£69,672), all of British manufacture.

GERMAN POTATO PRODUCTS.

The Board have received through the Foreign Office a communication from H.M. Consul-General at Hamburg from which it appears that the German potato crop of 1897 was, on the whole, slightly below the average both in quantity and quality; and reports indicate that the percentage of starch, as well as the size of the tubers, was comparatively small.

According to the preliminary estimates of the harvest of 1897 issued by the Government, the yield last year represented 87·5 cwts. of potatoes per acre, as against the final estimate of 76·4 cwts. in 1896 and 83 cwts. in 1895, from an area of rather over 7,500,000 acres. The percentage of diseased potatoes in the three years named is reckoned to have been 6·4, 9·9, and 2·8 per cent. respectively.

The export of potato-flour and starch from all parts of Germany in 1897 was 278,000 cwts., or considerably below the quantities recorded in recent years, which have been as follows :—

	Cwts.		Cwts.
1888 - - -	817,897	1893 - - -	598,913
1889 - - -	861,958	1894 - - -	726,780
1890 - - -	1,009,484	1895 - - -	597,502
1891 - - -	289,624	1896 - - -	666,6c8
1892 - - -	252,468	1897 - - -	277,982

About sixty per cent. of this export has of recent years taken place through Hamburg, which port in 1896 sent 130,085 cwts. of this commodity to Great Britain, 158,208 cwts. to Spain, and 53,886 cwts. to Italy. The total export of potato-flour and starch to Great Britain was 315,946 cwts. in 1896 and 160,541 cwts in 1897.

As the above figures show, the export trade in 1897 in this commodity was considerably less than in the previous year. The causes of this decline are stated to have been the low price asked by competing manufacturers in Holland and the low quotations for corn-starch in the United States.

Towards the end of 1897 the extensive demand for glucose—caused by the deficiency in the German fruit crop and the consequent large orders for moist starch from inland glucose factories—enabled the home manufacturers to abstain from competing abroad, as they found that they could do a more profitable business in Germany itself. It is thought, however, that this abstention may afford foreign competitors an opportunity for introducing their products in such outside markets, and that the Germans may thus find themselves to some extent at a disadvantage in the future.

Cash prices for potato-flour and starch, of which only a small stock remained on hand at the end of the year, were on December 31st about 9s. 5d. to 9s. 8d. per cwt. for prime coarse-grained potato-starch; 9s. 2d. to 9s. 5d. per cwt. for prime potato-flour within the Customs Union, and 9s. to 9s. 2d. per cwt. in the free port. The stock on hand at the end of 1897 is estimated to have been 18,200 sacks, against 25,400 sacks in 1896.

The prices of dextrine were naturally subject to the same variations as those of starch and flour. They stood at 11s. 6d. per cwt. f.o.b. Stettin, at the commencement of the year, and 12s. 6d. per cwt. at the end of last December. The exports of dextrine did not experience so serious a fall as did those of starch and flour, a circumstance which is ascribed to the difficulty of finding a substitute for German dextrine in other countries. The annual exports of dextrine from Germany during recent years have been as follows:—

	Cwts.		Cwts.
1888 - - -	141,399	1893 - - -	144,689
1889 - - -	168,504	1894 - - -	144,564
1890 - - -	185,676	1895 - - -	171,384
1891 - - -	118,187	1896 - - -	217,782
1892 - - -	85,663	1897 - - -	194,003

Not quite half of the total German exports of this article have on the average been shipped from Hamburg during recent years, and it would appear that nearly all the decrease in 1897 as compared with 1896 was in Hamburg shipments; other ports sending much the same quantity as usual.

Grape sugar in solid or liquid form (or, as it is called in Germany, starch-sugar) is only exported in small quantities, but its consumption in Germany itself is considerable, and

reached an unusually high figure during the latter months of 1897. As already noted, moist potato-starch was in great demand last autumn by German liquid grape-sugar factories, and the consequence was that grape sugar experienced a rise in price. It appears that, owing to improvements recently introduced in the production of liquid grape-sugar, this article is now very largely employed in the manufacture of sweetmeats and confectionery of a superior kind. The large demand last year is, however, principally ascribed to the deficiency in the German fruit crop, and also to a lack of sugar in the lower class German wines of the 1897 vintage, as well as to the limited yield of honey in most parts of Germany. These deficiencies are ascribed to the small amount of sunshine during the summer.

At the beginning of 1897 prices for 44 degree prime grape sugar stood at 11s. 5d. to 11s. 8d. per cwt., while at the end of the year they were 1s. per cwt. higher.

According to the latest returns, the annual production of grape-sugar in Germany during recent years has been as follows (years ending 31st July) :—

Years.	Liquid.	Solid.
	Cwts.	Cwts.
1889-1890 - - - -	681,295	345,325
1890-1891 - - - -	546,205	211,646
1891-1892 - - - -	228,892	69,791
1892-1893 - - - -	552,536	170,632
1893-1894 - - - -	519,681	155,493
1894-1895 - - - -	486,100	134,878
1895-1896 - - - -	622,040	167,420
1896-1897 - - - -	685,053	124,019

The quantities of grape sugar exported in 1897 and eight previous calendar years have been as follows :—

Year.	Liquid.	Solid.
	Cwts.	Cwts.
1889 - - - - -	137,445	136,956
1890 - - - - -	210,124	176,884
1891 - - - - -	68,365	50,500
1892 - - - - -	26,266	17,111
1893 - - - - -	41,374	40,794
1894 - - - - -	69,304	44,022
1895 - - - - -	54,690	33,699
1896 - - - - -	46,186	33,776
1897 - - - - -	28,103	20,012

About seventy-five per cent. of these shipments have, as a rule, of late years been destined for the United Kingdom and Australia.

AGRICULTURAL MACHINERY IN SOUTH RUSSIA.

Acting-Consul-General Mackie, in his annual report to the Foreign Office on the trade of the consular district of Odessa for the year 1897, observes that in portable engines and threshers German competition has made itself felt. The success realised by German machines over English is due to the long terms of credit given by German firms, in some instances amounting to three or four years, and the small amount of cash-payment taken; cases are known where the sum received actually failed to cover duty and freight.

Business could, it appears, be done by English firms in manual-delivery reapers if in point of weight these machines could be adapted to Russian requirements. An energetic representative of a well-known English firm sent a machine of Russian make home as a pattern to copy, but his firm came to the conclusion that the market was closed to them by customs protection. An American firm is now successfully introducing these machines into Russia. Their success is due to the malleable steel exclusively used by them in casting harvesting machinery. Prices of local machines range from £14 to £15, American ones between £15 and £17, the superior quality more than making up for the difference in price.

England principally supplies portable engines and threshers of a complicated system not produced in Russia, but with the successful introduction into the country of a plough specially manufactured in England to meet the peculiar requirements of the Russian agriculturist, similar implements of home make were driven down 20 per cent. in price, in spite of customs protection.

There is said to be a good market in the district of Theodosia for all kinds of British agricultural implements, such as ploughs, seed-drills, manual-delivery reapers, horse-

power threshing machines, etc. At present this trade is entirely in the hands of Russian and German manufacturers; the latter especially do a large trade in ploughs.

There is also a good demand for horse-power threshing machines of improved construction with straw shakers, riddle and corn screen, and automatic feeder. These machines are much in favour with the peasant proprietors and German colonists, and they prefer them to the steam threshers, firstly, because the capital invested is small compared with the latter—they are sold, including horse gear for eight horses, at £105—and secondly, they are afraid of using steam-power, not being accustomed to it. Russian and German firms are the only sellers of this kind of machine in the consular district of Odessa. Steam threshing machines are in limited demand, but a few sets are sold every season. German makers are trying hard to get hold of this branch, and are pushing their machines and competing with well-known British makers, and they have succeeded in selling several sets during the last two years in the Crimea.

The chief demand is for reapers with manual delivery, the peasant proprietors and colonists prefer them to the English and American made machines with rakes. Binders are very little known in the district, and are considered too complicated for the ordinary farm labourer to work; but Mr. Mackie thinks that a profitable business might be done in these binders, if British makers would only push the business and send out a competent man for one or two seasons to put the farmers in the way of working them.

With regard to Chilian nitrate of soda, which may now be imported into Russia duty free, Mr. Mackie states that the advantages of this fertiliser have, during the past couple of years, been receiving the attention of farmers, fruit-growers, viticulturists, and sugar beetroot growers throughout Russia, articles appearing upon the subject in the newspapers both in North and South Russia, while an active propaganda by means of circulars and pamphlets is spreading throughout the country. The valuable assistance of the rural communes and other official bodies has been enlisted in carrying out trials of this nitrate upon grain, sugar-beets,

grape vines, etc. Orders in this rapidly-growing trade are going almost exclusively to Germany, where Russians find they can buy on three to six months' credit as cheaply as they can from England upon cash against bills of lading. Mr. Mackie fears that unless British firms are willing to waive the point, this trade will be carried on exclusively through Hamburg, whereas upon equal terms the Russians prefer to do business with English firms.

[*Foreign Office Report. Annual Series. No. 2, 171. Price 2d.*]

DUTIES ON AGRICULTURAL ARTICLES IMPORTED INTO RUSSIA.

Mr. Consul-General Michell, in his Report on the Trade of the St. Petersburg District for 1897, gives the following information as to the alterations which have been made in the Customs tariff on certain artificial manures and preparations, and on agricultural machinery and implements. The value of the agricultural machinery imported into Russia under the old tariff is shown in this Journal for December, 1897, page 370.

According to a decision of the Council of the Empire, confirmed by His Imperial Majesty the Emperor, and in accordance with the recommendations of the Minister of Finance, the following articles hitherto dutiable are to be admitted respectively free, or at reduced rates of duty into the country.

Duty free :—

Glutin (Ermish) for protection of trees against injurious insects ; Stassfurt salt, though ground ; chloride of potassium ; potassic sulphate ; Chilian saltpetre (nitrate of soda) ; sulphuret of carbon ; Schweinfurt green.

All preparations for treating diseases of the vine and fruit trees specified in a list confirmed by the Minister of Finance acting in consultation with the Minister of Agriculture and Imperial Domains.

The above provisions came into operation on the publication of the Decree.

Reduced rates :—

Portable engines (locomobiles) for working multiple action threshing machines and steam ploughs, 4s. 11d. per cwt. (old rate 13s. 9½d. per cwt.).

Reapers and binders, reapers with self ejectors, steam ploughs, clover threshers with two drums and beaters, steam threshers with drums not less than 4½ feet broad and joint pins not less than 40 inches broad, hay-makers, horse rakes, grass-seed dressers, dressers with spiral wire cylinders, potato sorters, powdered manure spreaders, crushers, bellows and injectors for vines and trees, grape crushers, grape presses, centrifugal cream separators and their parts, all newly invented or perfected agricultural machines and implements imported for experimental farms or museums.

All spare parts imported with portable engines, threshers, and steam ploughs, are to be free of duty, but those of the agricultural machines and implements here specified to pay duty at the rate of 4s. 11d. per cwt. Manila hemp twine for binding sheaves as well as linen bands for sheaf binders and graders to be imported duty free.

The reduction and partial abolition of the rates on agricultural machinery and implements are to come into operation from September 13th, 1898, and all the reductions and modifications are to remain in force to December 30th, 1903, when the period for which the commercial tariff between Russia and Germany was concluded will expire.

[*Foreign Office Report, Annual Series, No. 2169. Price 5d.*]

WARSAW WOOL FAIR.

The Foreign Office have recently published a Report by Mr. Consul-General Murray on the Warsaw Wool Fair of 1898. In this Report Mr. Murray remarks that the chief feature of the wool markets of the world during the past year was a rise in prices owing to the smaller production of wool. At the end of 1897 and at the beginning of this year there

was a strong demand for wool on the German market, so that German merchants tried to obtain wool from Poland; they were not able, however, to obtain any quantity, as the stock of 1897 wool which still remained to be disposed of was at that time very small. At the small fairs held at the beginning of June this year in various places in Silesia and Prussia there was very little wool put on the market at all, and at the big fairs of Thorn, Breslau, and Posen the quantity of wool was much less than last year, from which cause the tendency of the market was upward.

The wool remaining unsold from the Warsaw Fair of 1897 was only 225,828 lbs., and, the demand for wool throughout the year being so strong, only a very small quantity of last year's wool—some 47,196 lbs.—was still to be disposed of at the beginning of this year's fair. The total quantity of wool offered for sale in 1898 was 2,082,600 lbs., as against 2,542,428 lbs. in 1897. This decrease was attributed partly to the fact that the quantity of wool actually produced was less this year, and partly to the circumstance that wool had been bought by the manufacturers and sent direct to the factories previous to the fair.

The following were the average prices paid during the fair for each quality of wool.

QUALITIES.	PRICES IN PENCE PER LB.			
	1898.		1897.	
	From	To	From	To
	<i>d.</i>	<i>d.</i>	<i>d.</i>	<i>d.</i>
Extra fine - - -	10	13	10	12
Fine I. - - - -	9	10	8	9
Fine II. - - - -	8	9	6	8
Medium - - - -	7	8	4	7
Inferior - - - -	6	7	—	—

A characteristic of the Warsaw Wool Fair consists of the way in which prices are fixed; it might be expected that prices, once fixed for wool of different qualities, would be generally adopted for the various transactions, but, on the

contrary, the price paid in each separate transaction is generally based on the price which was obtained for the wool from that particular farm in the preceding year, to which is added or from which is deducted the average fall or rise of prices at the fair. The reason of this lies in the importance which is attached by manufacturers to buying wool of the same origin, and it has been frequently noticed that buyers deal year after year with the same producers. In the absence of a standard according to which wool brought to the fair would have to be classified, which would greatly facilitate transactions, the origin of the wool is practically the only guarantee of its quality to the buyer.

The fair is held under Government superintendence, the regulations as to the conduct of the fair, and the wool sold thereat, being very strict. The wool, before being brought to the fair, has to be examined, and a certificate signed by the head of the village or burgomaster has to be produced, to the effect that the wool is from sheep in good health, and that there were not any diseased sheep or cattle on the same pasture ground with these sheep at the time of shearing.

The fair attracts many foreign as well as local buyers.

STEAMBOAT SERVICE FROM DENMARK TO ENGLAND.

From a Foreign Office Report on Bounties on Shipping and Preferential Railway Rates it appears that there are two subsidised lines of steamers from Denmark to England. The line from Esbjerg to Parkeston is given a grant proportional to the lower rates charged by the company on the freight of dairy produce and fish transported to England. This grant in 1896-97 amounted to £10,404. Since September, 1897, a grant has been made to the United Steamship Company of Denmark for establishing a bi-weekly service for the carriage of dairy produce between Esbjerg and Grimsby, destined for the Midland markets of England.

For this purpose a grant of 75,000 kroner (£4,166) was voted in the current year's budget.

This route is now placed under Government supervision, and it is stipulated that the company provide for the careful treatment of the goods. The ships on the line are to be fitted with refrigerators suited to the different descriptions of goods carried, and a reduction of about 20 per cent. is to be made in the former freights. The rates are to be for one ton of butter, 16s. ; of salt meat, 12s. ; of fresh meat, 18s. ; of eggs 20s. ; and of fresh fish, 14s.

TRANSPORT CHARGES IN THE UNITED STATES.

A report has recently been issued by the Division of Statistics of the United States Department of Agriculture, which deals with the changes in the railway and transport rates which have taken place during the past thirty years. The information is principally given in tabular form, and shows the rates for conveying various commodities on the chief traffic routes in the United States. Among the agricultural products shown are wheat, maize, and live stock, the rates for which appear to have declined from one-half to one-third of the tariff thirty years ago.

In the case of wheat, the transportation rate between Chicago and New York by the Great Lakes and the Erie Canal has declined from 15.95 cents per bushel in 1867 to 4.35 cents in 1897. The highest rate was in 1872, when it was 21.55 cents, and the lowest was 4.11 cents in 1895. The proportion which the transport rate bears to the price of wheat has, notwithstanding the heavy fall in wheat prices, shown a rapid decline. In 1867 the export price was approximately $5\frac{3}{4}$ times the cost of transport, whilst in 1897 it was about $17\frac{1}{4}$ times as great, that is to say, that in 1867 one bushel out of every $5\frac{3}{4}$ bushels received at New York for export was taken by the carriers as compensation for transportation east of Chicago, but in 1897 only one bushel was deducted out of each $17\frac{1}{4}$ bushels arriving in this manner. The rates for the conveyance of wheat from Chicago to New York by lake and rail and entirely by rail do not exhibit so

great a decline, the fall being from 60 to 65 per cent. The average rate per bushel, as reported by the New York Produce Exchange, was 20·76 cents in 1868 and 7·37 cents in 1897 *viâ* lake and rail, and 30·49 and 12·32 cents *viâ* all rail.

LEGISLATION CONCERNING FERTILISERS IN THE UNITED STATES.

According to a bulletin issued by the United States Department of Agriculture, all the states east of the Mississippi River, with Missouri, Arkansas, and Louisiana (twenty-nine in number), have laws relating to the inspection and sale of commercial fertilisers. This region is the fertiliser-consuming region of the country, the remainder of the states using comparatively insignificant quantities. The occasion for this legislation is stated to have been the fraudulent character of the commercial fertilisers manufactured and offered for sale, the chemical constituents of which were misrepresented or concealed, and were of less value than stated by the manufacturers and dealers.

The laws of the various states with regard to the sale of fertilisers differ only in minor details, and in general are of the following character. The secretary of the State Board of Agriculture, or some other State official, is authorised to issue licenses for the sale of fertilisers upon the payment of an annual fee for each brand, or for each specified quantity sold, and the licensee must affix to each package of fertiliser sold a statement of the chemical analysis of the fertiliser, his own name and address, and the net weight of the package—a copy of the said certificate to be sent to the State official, together with a sample of the fertiliser. The State official employs a chemist to analyse samples of fertilisers, and the results of analyses are published, together with statements of the commercial value of the various brands as shown by the quantities of their various components. A regular analysis of each brand of fertiliser is usually made annually, but the State official may authorise anyone to select from any

package of fertiliser exposed for sale a small quantity, and send the same to him for analysis, to see whether it agrees with the certificate attached to the package.

BACON TRADE OF SWEDEN AND DENMARK.

Mr. Consul Duff, in his Report to the Foreign Office on the trade of the Gothenburg District for 1897, observes with reference to the Swedish bacon trade that the market for Wiltshire-cut bacon was very steady all through the past year, and that prices advanced about 30 per cent. on those of 1896, and 35 per cent in comparison with 1895, but Swedish exporters were unable to take advantage of this improved state of the market.

The export from Sweden in 1895 was the highest on record, and amounted to 200,000 cwts. During 1896, when prices improved, the export declined to 140,000 cwts., while during the year 1897, when prices were 35 per cent higher than in 1895, the exports only reached 80,000 cwts., or a decline of 60 per cent. The reason for this state of affairs is explained as follows: It is impossible to raise pigs profitably without access to cheap feeding stuffs, and the failure of the crop of oats during the last two years has forced many to abandon breeding altogether.

Denmark, according to Mr. Duff's report exported 1,000,000 cwts. of bacon in 1895, 1,220,000 cwts. in 1896, and in 1897, 1,020,000 cwts., thus reaping ample advantage from the rise in 1897. In that country the export of bacon has become quite a national industry, the figures for 1890 being 560,000 cwts., against 1,020,000 cwts. in 1897.

In both Sweden and Denmark dairy offal (separated milk) is largely used for fattening swine, but the chief food is grain, consisting of maize, barley, etc., which is imported from America and Russia into Denmark free of duty, and consequently renders the farmer independent of the home crop. In Sweden, where an import duty of 2s. 1d. per cwt.

is levied on maize, equivalent to about 50 per cent. of its present value, imported food would prove altogether too expensive.

As matters now stand the Swedish trade in bacon is a precarious one, depending principally on the oat crop, which has been a failure during at least three years of the past decade.

[*Foreign Office Report, Annual Series, No. 2,161, Price 2½d.*]

AGRICULTURAL INSURANCE IN BAVARIA.

In a report published by the Foreign Office on the trade of Bavaria, Mr. Frederic Harford, Her Majesty's Chargé d'Affaires at Munich, observes that it is a striking proof of the efficacy of State initiative in Germany that the State cattle insurance department, which only commenced operations on October 1st, 1896, had on August 1st, 1897, no less than 805 local associations affiliated to it, with 36,376 members insuring 169,249 cattle and 12,642 goats. Up till 1895 there were eight private societies for horse and cattle insurance, and in that year only 11,250 horses and 3,559 cattle were insured.

There are now 900 local associations, with an insurance capital of £2,050,000, and in some districts 15 per cent. of the cattle are insured. The insurers are mostly small farmers and peasants, and so far the larger farming owners have only adopted insurance to a small extent.

The average payment of each insurer under the State department amounts to 1·11 per cent., compared with 3 to 5 per cent. charged by private companies. In the first year of its existence the department paid £32,809 compensation for 4,614 claims, of which 25 per cent. were for losses by disease, the chief being tuberculosis, of which there were 959 cases. The average insurance value of the cattle was £10 per head.

Bavaria is visited in summer by frequent thunderstorms, often accompanied by violent hailstorms. In 1895 damage to the amount of £234,522, and in 1896 to the amount of

£507,536, was caused by hail. The average damage per hectare (2·47 acres) was £3, or nearly 24s. an acre. To provide against this loss there exists a State hail insurance department as well as four private societies. In 1895 they paid as compensation in all the sum of £96,903, and received in premiums £121,247. The preference shown for the State department is proved by the fact that the latter effected 75 per cent. of this business. In June, 1898, the hail insurance department had 116,000 insurers.

[*Foreign Office Report, Annual Series, No. 2, 1898. Price 1½d.*]

FRENCH AGRICULTURAL WARRANTS LAW.

The Agricultural Warrants Bill, noted recently in this Journal*, underwent some modification in passing through the French Chambers. The law, as finally passed, has been published in the *Journal Officiel* (20th July, 1898), the chief changes in the provisions already noted being as follows:—

The classes of produce upon which a warrant may be obtained are: cereals, in the sheaf or thrashed; dry fodders, dried herbs; dried vegetables and fruits; fœculæ; animal or vegetable textile matters; oleaginous seeds and seeds for sowing; wines, ciders, brandies, and alcohol; cocoons; cut woods, resins, and tanning barks; cheeses, honey, and wax; vegetable oils; and agricultural salt.

It is not necessary for the farmer pledging his produce to insure it; but he is responsible for the goods which remain under his care, and has no indemnity in the case of damage. The registration stamp of fifty centimes is only obligatory in case of protest; and the warrant, to be negotiable, is subject only to the usual commercial stamp of one halfpenny per £4.

* Vol. IV., Dec., 1897, page 349.

THE MARGARINE INDUSTRY IN BELGIUM.

In the report on trade of Antwerp for the year 1897, Mr. de Courcy Perry, C.M.G., H.M. Consul-General at that port, states that the margarine industry is rapidly growing in importance in Belgium. The principal centre of the industry is in the district surrounding Antwerp, where there are some fifteen factories with an annual output of upwards of 22,000,000 lbs.

Margarine now forms an important article of consumption in Belgium, and the Government supervision over its manufacture and sale is of the strictest description. The following are some of the principal regulations on the subject :—

1. Margarine intended for sale shall not contain more than 5 per cent. of butter (this stipulation is made in view of the difficulty of distinguishing between pure butter and margarine when the latter contains a large proportion of the cream product).

2. Margarine shall not be exposed for sale in the same place (shop, stall, etc.) as butter, nor shall producers or vendors of cream butter keep margarine, even for their own consumption, in the same place as butter intended for sale.

Besides the above special regulations there are others of a general nature providing that margarine shall always be sold in the form of cubes; that all vessels containing margarine shall be clearly marked to indicate their contents; and that bills of lading or other documents referring to the same shall distinctly state its nature. Further, margarine must not contain preservatives of any kind, or be coloured except with such matters and to such a degree as authorised by the Minister of Agriculture.

[*Foreign Office Report. Annual Series. No. 2,137. Price 1d.*]

UNITED STATES EXPORT TRADE FROM GULF PORTS.

In a recent report to the Foreign Office on the improvement of the entrance to Galveston Harbour, Mr. Nugent, Her Majesty's Consul at that seaport, refers to the deflection of

trade, particularly the export trade, which has taken place during the past few years from the eastern parts of the United States, notably from New York, and which has been absorbed by southern and Gulf ports.

Mr. Nugent states that the total increase in value of the exports from the United States for the year ended June 30th, 1897, amounted to £35,079,000, of which sum over £20,800,000 was accounted for by southern ports.

The grain of the great territory west of the Mississippi is finding its way to Galveston in ever-increasing quantities, and the Chicago and New York shippers recognise that in New Orleans and Galveston they have no mean rivals. The last few years have revolutionised the grain business, and the building of railways from north to south instead of from east to west has poured into the lap of the southern and southwestern ports an endless stream of cereals.

In the principal surplus-producing States east of the Mississippi the yield of maize was 454,734,000 bushels in 1889; while west of that river it was 958,858,000 bushels, having increased 100 per cent. since 1879. The amount of wheat grown in the principal surplus-producing States east of the Mississippi was, in 1890, 96,344,000 bushels; whilst west of the river it was 158,926,000 bushels.

In 1860 only 14·42 per cent. of the population was to be found west of the Mississippi River; in 1870 the ratio was 17·84 per cent.; and 22·45 per cent. in 1890.

[*Foreign Office Report, Miscellaneous Series, No. 464. Price 6d.*]

STATE AID TO PRUSSIAN AGRICULTURE.

A Foreign Office report, which has recently been published, contains an abstract of a report by the Prussian Minister of Finance upon the Prussian Finances from 1890 to 1897. The object of this report was to remove misunderstanding as to the financial position and policy of Prussia, by presenting an intelligible review of the development of State finances over a term of years. In that portion of the report which refers to agriculture attention is called to the pains

which have been taken in the last eight years to relieve the distressed condition of agriculture. It cites as instances the spirit and sugar bounties, and the accompanying legislation as well as the changes introduced into the imposition of local taxes. The credit of the State has been deeply engaged in the interests of agriculture, *e.g.*, by the employment of the State agricultural banks (*Rentenbanken*) in assisting the sale and purchase of real property, the transactions of this nature having increased in six years from £67,000 to £425,000.

Progress has been made in the assistance afforded by the State to agricultural improvements, planting, draining, and the like. The number of officials employed for this purpose by the State increased from 28 to 108 in the past seven years. In this period a sum of £280,000 has been granted for extraordinary expenditure in agricultural improvements. Technical agricultural education, dairy schools, horse-breeding, model farms, fish-breeding, and the starch industry have received the increased attention and support of the State, as is shown by the money freely granted for these purposes. The grant for horse-breeding alone rose from £102,000 in 1880-81 to £155,000 in 1890-91, and £177,000 in 1898-99.

[*Foreign Office Report, Annual Series, No. 2,157. Price 1d.*]

INTERNATIONAL POULTRY EXHIBITION AT ST. PETERSBURG.

The Board have now received a copy of the rules and regulations of the International Poultry Exhibition at St. Petersburg, which was referred to in the last number of this Journal. This exhibition, which is intended to promote poultry-keeping in Russia by the exhibition of varieties of birds and appliances, both of home production and from abroad, will be held at St. Petersburg from the 13th to 28th May, 1899. The exhibition will include all descriptions of poultry and game, pigeons, singing and other birds, dead poultry and game, poultry products, apparatus and appliances, foods, and works of ornithological science and art. All

persons, societies, clubs and organisations, Russian and foreign, engaged in the breeding or otherwise interested in birds will be admitted as exhibitors. No customs duty will be levied on exhibits which are re-exported within two months after the closing of the exhibition, and goods for the exhibition will be conveyed on Russian railways at special rates. Application for printed forms of entry and for further particulars should be addressed to the Committee of Organisation of the International Poultry Exhibition, Fontanka 10, Imperial Agricultural Museum, St. Petersburg. Forms of entry must be sent in by the 13th March, 1899.

The chief districts whence Russian poultry is sent to the

**Russian
Poultry.**

London market is situated around the station "Czorkowo," where all owners of land, both large and small, besides peasants, keep poultry in enormous quantities. The birds are fed up and killed at the beginning of the winter, when the frosts begin, and are sent frozen in casks and boxes, in part to St. Petersburg and Moscow, and in part to Libau for shipment to London.

Poultry farming is found so profitable that a good many peasants have lately given up their ordinary occupations to devote themselves entirely to it. This trade is open to great improvement; but great difficulty lies in the ignorance of the peasantry. The methods of packing have lately been much improved. All sizes of birds were formerly packed together; but now they are graded into three qualities, and packed in paper in cases containing from seventy to a hundred head.

Russian fowls are considered on the London market to be of inferior quality, being of bad flavour, very dry, and of small size. Her Majesty's Consul-General at Warsaw has been informed that the want of flavour arises greatly from the careless way in which they are unfrozen in London; but he is of opinion that the principal causes of the inferiority of the Russian fowls are due to the small breed which is reared, and above all to the want of proper feeding, especially

during the three weeks before the birds are killed, when they would increase from $1\frac{1}{2}$ to 2 lbs. in weight if they were scientifically fed.

[*Foreign Office Report, Annual Series, No. 2, 135, price 3d.*]

According to a circular issued by the United States Department of Agriculture, the forest area of the United States (exclusive of Alaska) may be placed at somewhat less than 500,000,000 acres. This does not include much brush and waste land, which is, and will remain for a long time, without any economic value. The area is very unevenly distributed, seven-tenths being on the Atlantic side of the continent, only one-tenth on the Pacific Coast, another tenth on the Rocky Mountains, and the balance scattered over the interior of the Western States. Both the New England States and the Southern States have still 50 per cent. of their area more or less under forest, but in the former merchantable timber has been largely removed. The Prairie States, with an area in round numbers of 400,000 square miles, contain hardly 4 per cent. of forest growth, and the 1,330,000 square miles of an arid or semi-arid character, which constitute more than one-third of the whole of the United States, contain practically no forest growth.

Information has been received through the Foreign Office that the period of admission of wheat duty-free into Italy having expired on 30th June last, the Italian Government decided to admit wheat at the reduced duty of 2s. per cwt. until the 15th July. This period was subsequently extended by Royal Decree until the 15th August, after which date the full duty of 3s. per cwt. was re-imposed.

The Roumanian Ministry of Agriculture has recently published statistics of the areas and crops of the vineyards and plum orchards of Roumania for the year 1897. The total area of vines under cultivation was estimated at 380,000 acres, of which less than one-third was productive, the total yield being calculated at 5,491,860 gallons of wine, of the value of £302,000, or about 1s. 1d. per gallon.

**Roumanian
Vineyards and
Orchards.**

The cultivation of plums is an important industry in Roumania, chiefly on account of the national drink of the lower classes being a kind of plum brandy called "tuica"; there were estimated to have been about 135,000 acres under cultivation in 1897, planted with plum trees at the rate of about 240 to the acre, but only 42,100 acres are estimated to have been productive. The yield was 1,281,000 bushels of plums, of the value of £130,708. These statistics show that the rains and floods of last year's season affected the vine-growing districts of the country to the extent of over two-thirds of the total area, the plum-growing districts having suffered to about the same extent.

According to the Report of the Chief Inspector of Factories and Workshops, the number of reported cases of anthrax in man increased from seventeen in 1896 to twenty-three in 1897. Fourteen were connected with the

**Anthrax in
Foreign Wool
and Hides.**

handling of hides and skins, and nine with wool-sorting. The former industry has since the close of 1897 been certified by the Secretary of State as a dangerous trade, and special rules are being prepared. Special rules for wool-sorting were issued during 1897 and served upon occupiers of all works in which the sorting of the dangerous kinds of wool and hair named in the rules was known to be carried on. The rules are based upon the draft suggested by the Committee on Dangerous Trades, and follow the general basis of the

voluntary regulations which have for some years past been adopted in the Bradford district.

In view of the importance of the cheese trade in the Netherlands, it may not be without interest to notice the fact that, according to the *Nieuwe Rotterdamsche Courant*, a meeting took place at the Chamber of Commerce at Leiden on the 9th August last to consider a report in regard to the causes which have entailed a serious decrease in the export of Dutch cheeses to England.

**Dutch Cheese
Trade.**

It appears from this report that four principal reasons are given for the decrease in question. In the first place it is attributed to the severe competition on the part of Canada; secondly, to the fact that an inferior article is put on the English markets passing for Edam cheese, and of the same form and colour, but made from skimmed milk; thirdly, because the British public have a preference for cheeses of the shape and taste of Cheddar, and the London retailer prefers to buy this kind, inasmuch as once cut there is a less tendency for the remainder to dry up so quickly; lastly, because the high prices which Dutch cheeses obtain in France, Germany, and the Dutch colonies operate to prevent efforts being made to regain a lost market.

The growing importation of tallow is a noticeable feature in the foreign trade of Russia. Not many years ago that country was the chief source of supply of this article to most of the markets of Europe, whereas the present export is insignificant, amounting in 1897 to only 1,677 tons. In 1860 the export of Russian tallow to all countries amounted to 59,000 tons. It is considered, however, that this change is due not so much to the diminution of cattle in Russia as to a fall of prices for the commodity in the London market, which has made

**Export of Tallow
to Russia.**

the export of the Russian production unprofitable. The largest share in the supply of tallow to Russia is taken by Great Britain, and, according to the Russian customs returns, out of a total import of 22,581 tons in 1897, 17,613 tons came from Great Britain and her colonies. The total importation has shown a very great increase during the past five years, the entry in 1893 only amounting to 5,668 tons. The export from this country to Russia in 1897 shown in the trade returns of the United Kingdom corresponds with the Russian figures given above, the total export being put at 16,697 tons, of the value of £309,501, but the entire British export of tallow and stearine is of foreign and colonial production.

REPORTS ON FOREIGN CROPS.

CROPS IN THE UNITED STATES.

The September report of the Statistician of the United States Department of Agriculture furnishes the following particulars of the condition of the principal crops in that country on September 1st, 1898.

The average condition of the whole wheat crop, when harvested, was 86·7, or one point higher than the average of last year, and 12·1 points higher than that of 1896. The Statistician remarks that, in accordance with its usual practice, the Department has not yet made any quantitative estimates of the wheat crop, and will not do so until the revision of the wheat acreage is completed, which will show some increase over the preliminary figures.

The condition of maize was 84·1, or 4·8 points higher than at the corresponding period last year, but 6·9 points lower than in 1896. Rye showed an average condition of 89·4, a reduction, compared with last year, of 0·7 point; but an improvement over 1896 of 2·6 points. The average condition of oats was 79·0, or 5·6 points lower than in 1897. Barley had an average condition of 79·2, or 7·2 points lower than last year. The average condition of potatoes was 77·7, or 11 points better than at the corresponding period of 1897.

THE INDIAN WHEAT CROP, 1897-98.

The final General Memorandum on the Indian wheat crop of 1897-98, which was issued by the Statistical Department of the Indian Government in June last stated that the latest returns showed that the harvest in Northern India was better than was predicted in the previous memorandum. The crop in Sind continued to do well, and the yield was good. The area sown in the Punjab was larger by 368,400 acres than the estimate in the second forecast, and 16 per cent. above the

decennial average. The yield was on the whole good, but it was feared that considerable damage was done to the unthreshed grain by storms in the third week of May. The crop in the North-Western Provinces and Oudh was exceptionally good, and the total yield was the best that had been known for several years. The crop in Bengal was also good.

In Western and Central India there had not been much improvement except in Bombay, where an excellent harvest in the Gujrat States, particularly Kathiawar and Kutch, helped to supplement the deficiency in other parts of the province. Generally there was a contraction of the area under wheat, due partly to the necessity of replenishing food-stocks by planting jawar and other grains, and partly to the unfavourable conditions of the season. In the Central Provinces the area and yield were respectively 44 and 27 per cent. below the decennial average. In Berar the yield, though more than double that of last year, was 74 per cent. below the decennial average, the area sown being 57 per cent. below the average. In the Nizam's Territory the estimated yield was 60 per cent. more than last year, but 39·4 per cent. below the average, and it was anticipated that owing to a failure of the winter rains the actual yield would be less than the estimate. Full reports had not been received from Rajputana and Central India.

The total wheat harvest was estimated to have yielded 30,365,000 quarters, or 7,500,000 quarters more than was produced in 1896-97. The following table gives the estimated produce and the exports of Indian wheat for the past ten years :—

Years.	Acreage.	Produce.	Exports.
	Acres.	Quarters.	Quarters.
1888-89	25,911,700	29,690,267	4,109,329
1889-90	24,773,000	28,574,000	3,220,515
1890-91	26,576,000	32,088,000	3,341,449
1891-92	24,482,000	25,830,000	7,072,000
1892-93	26,429,000	33,567,333	3,494,000
1893-94	26,778,000	31,598,000	2,837,000
1894-95	25,994,155	29,303,559	1,607,000
1895-96	23,242,171	25,717,837	2,334,000
1896-97	19,024,201	22,833,435	446,000
1897-98	22,501,561	30,365,160	559,000

It will be observed that the exports fluctuate considerably and cannot be said to bear any general relation to the size of the crop. This is largely due to variations in the local demand (1895-6 and 1896-7 were years of famine), and partly to the discouraging prices ruling in British markets. It is however, worthy of notice that the largest export, viz., 7,072,000 quarters, occurred in 1891-92, when the average price of British wheat was 37s. per quarter, and the value of imported Indian wheat about 36s. per quarter.

CROPS IN RUSSIA.

According to the *Trade and Industries Gazette*, the condition of winter-sown grains in August last varied considerably in parts of European Russia. Winter wheat was expected to furnish about an average yield. In the territory east of the Volga the crop was more or less indifferent; in the central and west central governments a moderate yield was looked for; but in the governments of the south and south-west the prospects were more promising. Spring wheat presented generally a more favourable aspect, and a good yield was expected in most of the governments of the west and south-west. Rye appears to have suffered materially from unfavourable weather in May and June, and the crop is stated to be on the whole under average, and in some districts a complete failure.

The Board have received through the Foreign Office a report from Her Majesty's Consul-General at Warsaw on the condition of the crops in Russian Poland and Lithuania. At the date of the report, August 27th, the harvest was over and nearly all the grain had been carried. Some trial threshings had given satisfactory results, and it was estimated that rye would furnish about an average yield and that wheat would yield about ten per cent. more than the average. Beetroot had suffered greatly from insects in the Government of Lublin, much having to be resown. Hop plantations had also suffered from the cold, wet, and stormy weather early in July, so that the crop was expected to be even worse than that of last year, and hop growers expected a rise in prices.

CROPS IN DENMARK.

The reports published by the *Ugeskrift for Landmænd* at the end of August stated that the greater part of the rye crop in Denmark had been harvested, and the wheat harvest was in progress everywhere. No definite estimate could be given as to the products of grain from these cereals. Much of the rye had sprouted, and the ears of wheat were generally not so full as usual, while injury from rust and insect attacks was here and there very pronounced. But although rye and wheat were indifferent, barley was reported to be a full crop, and a good yield of malting barley was expected.

Swedes and sugar beets were backward in consequence of the cold weather in the early summer. Potatoes were in good condition, and a satisfactory crop was looked for.

Meadows and grasses generally were promising.

CROPS IN FRANCE.

The report of the French Ministry of Agriculture on the condition of the crops on July 15th, 1898, states that winter wheat is very good in 9 departments, good in 62, and fairly good in 15 departments. Compared with the previous year the condition of winter wheat is favourable, since in 1897 only 27 departments were returned as good, all the remainder figuring as fairly good, passable, or inferior. With regard to spring wheat, which is not grown in 34 departments, it was reported to be very good in 4, good in 39, and passable in 9 departments. Rye, oats, and barley are also returned as good, or very good, in the majority of the departments in which they are grown. The hay crop was reported to be very satisfactory, both in respect of rotation grasses and pasture and meadow land. Potatoes were very good in 13 departments, good in 50, and fairly good in 22 departments. The crop was reported to be indifferent in one department. Cider apples were reported as being grown in 20 departments, in one of which their condition was reported as good, in 7 as

fairly good, in 11 as passable or indifferent. Sugar beet was grown in 40 departments; in 6 the crop was reported to be very good, in 33 as fairly good or good; and one department was stated to have a passable crop.

CROPS IN GERMANY.

According to the report issued by the Imperial Statistical Bureau at the end of August, the winter rye harvest was then almost over, and the yield of both grain and straw was very satisfactory; the harvesting of winter wheat had commenced everywhere, and the crop was a good one. The report indicated that the condition of winter grains was better than at the corresponding period for the past five years. Spring-sown grains were a little backward, but the favourable weather in August had brought them on well, and the harvest was expected to be generally satisfactory. Barley and oats were especially promising in Bavaria.

Much disease was reported amongst potatoes, especially on heavy lands, early varieties being particularly affected. The second cut of clover was expected to furnish an over-average yield, and the prospects for rotation grasses were good.

CROPS IN ITALY.

According to the reports published in July and August by the Ministry of Agriculture, the wheat crop in Italy will prove to be well up to, if not over, the average. Maize, hemp, buckwheat, and rice were promising, except in some central and southern districts, where the maize crop had suffered severely from drought, and forage crops were doing well.

A good crop was expected from the vines, but vineyards in Sicily and Sardinia were in want of rain.

CROPS IN AUSTRIA.

In the report issued by the Austrian Ministry of Agriculture in the middle of August, it was stated that the rye harvest in Austria was nearly over, while the wheat harvest was also completed in the southern districts, and was in progress elsewhere. Although these crops had not come up to expectations everywhere, the yield of grain was considered to be generally a good one both in quality and quantity. Barley was expected to furnish only a moderate crop, and the quality of the grain was not generally satisfactory. The oat harvest was yielding better results, and the condition of this crop was more hopeful than that of barley. Maize was very backward, and was not expected to recover from the effects of the cold weather of July.

Potatoes were generally a good crop ; and the hay harvest turned out well. — *Wiener Landwirthschaftliche Zeitung*, Aug. 21, 1898.

CROPS IN HUNGARY.

The *Wiener Landwirthschaftliche Zeitung*, of the 4th August last, quoting from the reports of the Hungarian Ministry of Agriculture, stated that the corn harvest was for the most part over and threshing was in progress. Wheat and rye were in quantity an average crop, while barley and oats were somewhat over average ; the quality was generally over average. The yield of these cereals was expected to be as follows :—Wheat, 14,923,000 qrs., or 17·5 bshls. per acre ; rye, 4,442,000 qrs., or 16 bshls. per acre ; barley, 7,358,000 qrs., or 21·5 bshls. per acre ; and oats, 8,602,000 qrs., or 26·4 bshls. per acre. All these are considerably better than last year. Other crops were generally average or good, but rain was required in many instances, especially for maize. Vines, and fruit generally, however, promised to be below the average.

CROPS IN ROUMANIA.

The Roumanian Ministry of Agriculture published early in September a preliminary estimate of the acreage and yield of the principal crops, except maize, in Roumania in the current year. According to the *Curierul Financiar* the results are as follows :—

	Acres.				Bushels.			
Wheat	-	-	-	3,590,392	-	-	-	56,650,275
Rye-	-	-	-	476,908	-	-	-	7,392,921
Barley	-	-	-	1,617,479	-	-	-	28,739,700
Oats	-	-	-	730,996	-	-	-	16,872,075

The estimated yields of wheat, barley and oats exceed considerably those furnished by the poor harvest of last year; they are also superior to the average yields of these crops in the five years 1893-1897.

CROPS IN NOVA SCOTIA.

According to the report of the Department of Agriculture of Nova Scotia, the season of 1898 in this province has been, upon the whole, satisfactory. The reports of the various crops estimated on information received up to July 4th last showed that the hay crop was an abundant one, being 8 per cent. above a full average crop on uplands, 6 per cent. on improved dykeland, and 4 per cent. on intervalles. Owing to the excessive crop of last year, there is a greater supply of old hay still in the country than has been the case for many years. It is expected that the large supply of fodder will lead to an increase of stock for beef and dairy purposes.

The potato crop promised to be slightly above a full average, and roots generally promised well. Grain crops were expected to furnish a larger yield than usual. There has been a notable increase in the acreage devoted to wheat in this province. This is stated to be due to two causes, namely: (1) The yield of last season was extra large wherever sown, and gave great encouragement to increased cultivation. (2) The great jump in the price of flour in the early spring, caused by the outbreak of the Spanish-American war, made the growth of wheat a leading feature among the farmers generally in

favourable localities. Lack of warmth and sunshine during the month of June retarded the growth of Indian corn for ensilage, and the crop will therefore be considerably below the average.

The fruit crop, which promised to be exceedingly abundant in the period of bloom, was seriously affected by the wet and cold weather which succeeded the blossoming season, and the returns from the great fruit region of the Cornwallis valley were discouraging.

CROPS IN ONTARIO.

The crop estimates of the present year, compiled by the Ontario Department of Agriculture, were issued in the August Bulletin of that department. The yield of grain is only estimated, and will be revised from the actual threshing results. The area under winter wheat is 1,048,182 acres, compared with 950,222 acres last year. This is the largest acreage devoted to winter wheat since 1883, when 1,097,210 acres were reported. The large increase of nearly 100,000 acres this year is partly due to the fact that only 25,159 acres were ploughed up this spring, as against 55,477 in 1897. It is estimated that the yield will amount to 25,305,890 bushels, or an average of 24.1 bushels per acre. The yield in 1897 was 23,988,051 bushels, which was the largest recorded during the fifteen years for which reliable estimates are available; the average yield in that period has been 18,022,748 bushels. The produce of the winter wheat crops of the present season is, therefore, the largest yield ever recorded in the Province. The spring wheat area is 389,205 acres, yielding 6,714,516 bushels. With regard to barley, the acreage, which has fallen steadily since 1890, when it was 701,000 acres, showed a further decline to 438,784 acres, yielding 12,048,245 bushels, which is a little above the yield of last year. Oats, on the other hand, have shown an increase in area of recent years, though this year's acreage is somewhat below that of last year, being 2,376,360 acres against 2,432,491 acres in 1897, but compared

with an average of 1,875,240 for the last fifteen years. The yield this year is 82,132,026 bushels.

CROPS IN MANITOBA.

Harvest returns from different parts of Manitoba are reported to be very encouraging, and the increase in the wheat area is estimated to amount to about 200,000 acres, making the total area under this cereal about 1,488,000 acres. The yield is estimated at 25,913,000 bushels, or about $17\frac{1}{2}$ bushels per acre. The oat crop is estimated to have yielded 18,030,000 bushels on an area of 515,000 acres; and barley is credited with a yield of 4,611,000 bushels on 158,000 acres.

The condition of live stock in all parts of the Province is reported to be generally satisfactory.

PARLIAMENTARY PUBLICATIONS.

Board of Agriculture.—Annual Report on the Distribution of Grants for Agricultural Education and Research in the year 1897-98 [C. 9061.] Price 8½d.

The total amount distributed by the Board in Grants for Agricultural Education and Research in the year 1897-98 amounted to £7,200, this sum being in addition to the other expenditure incurred in the inspection of the educational and experimental work of the institutions aided, and in visiting and reporting on the educational work of County Councils requesting such aid from the Board of Agriculture. As in previous years, the larger portion of the amount mentioned above was expended in subventions to collegiate centres in England and Wales, and in the case of two of these centres, viz., Durham College of Science and the University College of North Wales, additional grants were awarded towards the maintenance of the college farms. Grants were made to two Dairy Institutes and to a special class for the training of working gardeners and foresters at the Royal Botanic Garden, Edinburgh; the grant to the latter class will, however, in future be borne on the vote of Her Majesty's Office of Works.

Grants of a different type were also made by the Board of Agriculture towards the cost of certain specific experiments or research conducted by Agricultural Associations, which, although not ranking as teaching institutions, have found it useful to devote some portion of the subscriptions of their members to the prosecution of inquiries of this character.

In the appendix to the Report statements are furnished respecting the educational systems pursued by the eight collegiate centres of agricultural instruction in receipt of financial aid from the Board, giving a detailed account of the existing staff, the different courses of education offered, the relative amount of time devoted to different branches of instruction, and the number of pupils in attendance at each of these institutions.

The appendix also contains an interesting series of reports upon the character of the investigations carried out either directly under the supervision of the scientific staff of the aided collegiate centres, or, as in a few instances is still the case, conducted with a view to the elucidation of certain specific questions under the direct responsibility of Agricultural Associations, and with the aid of specially allocated grants.

In these investigations, perhaps the largest amount of attention has been directed to the best methods of manuring grass land, seven out of eight collegiate centres according to this question a place in their programme—while the field experiments of the Bath and West Society deal with features of the same problem. An interesting and novel development of these inquiries is presented in the experiments commenced at the demonstration farm in Northumberland, where the feeding of sheep on three-acre plots of variously manured poor pasture land is being carefully observed, and the results of the fertilisers applied tested not merely as regards the apparent bulk of grass obtained, but as to its feeding quality, by noting the comparative live weight increase exhibited by the sheep fed on the herbage of each plot.

The recent development of local activity in research and experiment is exhibited by a satisfactory increase of separate areas under experiment—no less than 192 of these being now reported in 18 English and 9 Welsh counties, under the more or less direct supervision and control of the aided colleges.

These experimental areas are exclusive of experiment stations managed by the societies mentioned in the report as recipients of grants, and they do not include the experimental plots and stations conducted independently by the

Councils of fifteen other English counties, as shown in the summary of County Council work presented in the report for 1896-97.

During the year seven counties, viz., Northumberland, Cumberland, Derbyshire, Essex, Berkshire, Hants, and Dorset, had their local methods of agricultural instruction inquired into and reported on by an inspector of the Board, while an application for a similar inspection of the work of the Lindsey division of Lincolnshire was acceded to.

The following is the list of grants awarded in 1897-98:—

Institutions aided.	Work.	Grant 1897-98.
University College of North Wales, Bangor -	Collegiate centre -	£ 800
Do. do. do. -	Collegiate farm -	200
Durham College of Science, Newcastle-on-Tyne	Collegiate centre -	800
Do. do. do. -	College farm -	200
University College of Wales, Aberystwith -	Collegiate centre -	800
Reading College - - - - -	Collegiate centre -	800
Yorkshire College, Leeds - - - - -	Collegiate centre -	600
University College, Nottingham - - - - -	Collegiate centre -	600
South-Eastern Agricultural College, Wye -	Collegiate centre -	600
Cambridge and Counties Agricultural Education Committee - - - - -	Collegiate centre -	500
Eastern Counties Dairy Institute, Ipswich -	Dairy instruction -	300
British Dairy Institute, Reading - - - - -	Dairy instruction -	300
Royal Botanic Garden, Edinburgh - - - - -	Class for foresters and gardeners -	150
Bath and West and Southern Counties Society	Field experiments -	50
Do. do. do. -	Cider experiments -	50
Do. do. do. -	Cheddar cheese research -	200
Highland and Agricultural Society - - - - -	Agricultural experiments -	100
Agricultural Research Association, Aberdeen -	Agricultural experiments -	100
Stewartry of Kirkcudbright Dairy Association -	Cheese discoloration enquiry - - - - -	50

Committee on Inland Transit of Cattle.—Report of the Departmental Committee appointed by the Board to inquire into and report upon the Inland Transit of Cattle. [C. 8928.]
Price 3½d.

Ditto. Minutes of Evidence, etc. [C. 8929.] Price 2s. 3d.

This Departmental Committee was appointed in July, 1897, by the President of the Board of Agriculture, with the

concurrence of the Chief Secretary for Ireland, to inquire into the conditions under which the transit of animals by road or rail is at present conducted, and to consider what further measures, if any, can with advantage be taken, either by legislation or otherwise, to protect animals from suffering, and to ensure their delivery in the best possible condition. The scope of the inquiry included Great Britain and Ireland, and the Committee state that while they fully examined the conditions of transit in both countries, it was soon apparent that it is in Ireland that the question is most urgent. In Ireland the proportional importance of the cattle trade is much greater, and the complaints of shortcomings in the present system are much more serious.

The Committee make a number of detailed recommendations regarding better supervision and accommodation at fairs and railway stations, and inspection at ports in Ireland. The Committee also make recommendations as to the railway pens and loading banks, and as to the construction of cattle-trucks. They advise that horned and dishorned cattle should be kept separate during transit. With regard to rest, food, and water, it is recommended that railway companies should have power to detain and feed at the expense of the owner animals which, after a voyage, are in their opinion unfit to continue their journey; that a company should be required to unload and feed, at the owner's expense, animals which have been in their charge for twenty-four hours, or have been twenty-four hours in transit without food. Permissive powers are recommended to be given to local authorities to make bye-laws requiring the licensing of drovers plying for hire within their authority; it is also advised that the substitution of an approved goad for the stick, and the dishorning of young cattle should be encouraged.

The Committee also recommend generally that the duties relating to cattle transit should be placed in the hands of the local authorities, subject to the supervision of the central authority.

Irish Land Commission.—Return of Prices of Agricultural Produce for the years 1881 to 1897 inclusive. [C. 8828.] Price 3s.

This publication shows the average prices of the principal agricultural products in Ireland for such years as can be given from 1881 to 1897, together with diagrams showing the fluctuations during that period. The following table gives a summary of the prices at five-year intervals, together with those for 1897 :—

	1881.	1886.	1891.	1896.	1897.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Wheat - - - per cwt.	0 9 5	0 5 11½	0 7 5	0 6 4½	0 7 3½
Oats - - - " "	0 6 3½	0 4 11	0 6 8½	0 5 0	0 5 3½
Barley - - - " "	0 7 5½	0 5 4½	0 7 4½	0 6 5	0 6 5½
Hay - - - " "	0 2 6½	0 1 11	0 3 3½	0 2 6½	0 2 7½
Potatoes - - - " "	0 3 0	0 2 5½	0 3 7	0 2 1½	0 3 0½
Butter - - - " "	5 8 4	4 3 5	5 3 6½	4 9 9½	4 8 1½
Pork - - - " "	2 12 3	2 3 1	1 19 5½	1 16 0	2 2 0
Flax - - - per 14 lbs.	0 6 11	0 6 7	0 5 11	0 4 8½	0 5 2
Wool - - - per lb.	0 0 11	0 0 9½	0 0 9½	0 0 9	0 0 8½
Eggs - - - per 120	0 7 3	0 6 5	—	0 6 5	0 6 1
Beef - - - per cwt.	3 4 0½	2 11 3	2 14 8½	2 12 1	2 13 0½
Mutton - - - " "	3 10 11	3 0 7	2 17 10½	2 17 8	3 1 5½
CATTLE.					
One-year-old - - per head	6 4 6	4 14 0	6 6 0	5 18 0	6 3 3
Two-year-old - - " "	9 17 0	7 14 10	9 10 9	8 13 2	9 1 0
Three-year-old - - " "	—	—	12 6 3	10 14 3	11 5 1
Springers - - - " "	—	—	13 12 6	12 13 5	12 16 1
SHEEP.					
Lambs - - - per head	1 6 7	1 3 3	1 7 1	1 5 1	1 4 4
Over 12 mos. and under 24 mos. " "	—	—	1 16 5	1 11 5	1 14 4
Two-year-old and over " "	—	—	2 3 8	1 15 7	1 15 3

Agricultural Statistics, Ireland, with detailed Report on Agriculture for the year 1897. [C.—8885.] Price 1s.

A summary of the tables of acreage and produce of the principal crops in Ireland in 1897, which are contained in this volume, was printed in the last number of this journal. The enumeration of the live stock in Ireland showed that there were 4,464,874 cattle and 4,157,906 sheep, representing an increase since 1896 of 56,741 and of 77,195 respectively. The number of milch cows was 1,434,925. The total number of pigs was 1,327,450, or a decrease of 77,136 as compared

with the year 1896. The number of cattle, sheep, and swine exported to Great Britain are given as under :—

Description.	1896.	1897.
Store cattle - - - - -	349,800	419,302
All other cattle, including calves -	331,760	326,710
Sheep and lambs - - - - -	737,306	804,515
Fat swine - - - - -	574,677	653,459
Store swine - - - - -	35,912	41,848

With regard to the dairy industry, it appears that the number of factories from which statistics were obtained in 1897 was 324, being an increase of 45 as compared with the number returned in 1896, and that the number of hands permanently employed amounted to 2,692, or 487 more than the number for 1896. Of the 324 factories, 132 were owned by individual proprietors, 107 were the property of joint stock companies, and 85 belonged to co-operative farmers. Nearly four-fifths of the total number were in Munster. In the 324 factories there were 668 milk separators, of which 568 were worked by steam-power. The quantity of butter returned as produced during the year ended September 30th, 1897, was 294,105 cwts., against 274,592 cwts. in the preceding year, together with 500 cwts. of cheese and 187,326 cwts. of condensed milk. The quantity of milk manipulated during the year was 88,774,085 gallons, or over 21 million gallons more than in 1896. The skim milk is in nearly all cases returned to the farmers.

PRICES OF LIVE STOCK.

RETURNED UNDER THE WEIGHING OF CATTLE ACT.

Returns of prices collected under the Markets and Fairs (Weighing of Cattle) Act, 1891, for the second quarter of 1898 are now available for comparison with the previous data supplied under this statute to the Board of Agriculture. As indicated in the last number of the Journal, the number of returning markets has been increased in 1898 by the addition of Carlisle and Falkirk to the 19 places scheduled in the Act. The aggregate number of animals shown at the 21 places from which returns are now received is thus considerably enhanced, there being 23,534 more cattle, 84,234 more sheep, and 3,670 more swine recorded at the new places named above.

The increase shown in the number of sheep entering the markets of Great Britain, in the second three months of 1898, compared with the like period of 1897, is thus more than accounted for ; but the totals of the following comparative statement indicate that the new markets are not suffi-

Animals.	2nd Quarter, 1898.	2nd Quarter, 1897.	2nd Quarter, 1896.
CATTLE :	No.	No.	No.
Entering markets - - -	323,369	280,275	268,864
Weighed - - - - -	33,484	29,685	28,859
Prices returned - - - -	30,656	27,728	27,201
Prices returned with quality distinguished.	23,833	20,941	19,737
SHEEP :			
Entering markets - - - -	1,200,032	1,119,015	1,136,350
Weighed - - - - -	16,609	13,336	13,130
Prices returned with quality distinguished.	13,342	12,060	11,425
SWINE :			
Entering markets - - - -	76,760	32,423	58,670
Weighed - - - - -	298	471	1,634
Prices returned with quality distinguished.	251	213	620

NOTE.—The figures for 1898 include the returns from Carlisle and Falkirk.

cient to explain the additional number either of cattle or of swine which appear to have been exhibited for sale this year. The excess in swine is mainly explained by the numbers returned in Birmingham alone, whence about half of the pigs shown as entering the English markets are now reported, although no instance of weighing is there recorded.

Placing side by side the returns of transactions for which prices, for each grade or quality, are duly shown, the total numbers, it will be seen, both of cattle and of sheep are greater than in the same quarter of 1897, and both England and Scotland contribute to this increase; but the percentage of animals weighed and priced is not quite so high as in the previous three months of this year, for weights and prices are quoted for only $2\frac{1}{2}$ per cent. of the English cattle shown, and for little over 22 per cent. of those shown in Scotland.

Sheep would appear to be weighed at 5 only of the 15 English markets and at 4 of the Scotch markets in the list; but in England no prices have been returned except at Leeds and Liverpool, and the inability of the local authorities to quote any price for such sheep as were weighed in London, Salford, and Wakefield is still without sufficient explanation.

In the first quarter of 1898 some cattle were weighed at all the 21 scheduled places; but in the quarter now under review the market of York is conspicuous by having no single case of weighing to record. Ashford, Salford, and Wakefield have been unable to quote prices for the small number of animals weighed at their markets, and the defective returns from Birmingham, Lincoln, and Norwich must be again reported as very unsatisfactory.

The largest number of cattle weighed and priced in the English towns in the quarter was at Carlisle, where 1,876 out of 19,596 shown have been returned; and the largest reports of weighing in Scotland come from Edinburgh, where 7,191 out of a total of 19,173, or rather less than were shown at Carlisle, have been returned. Not quite half of the stock weighed in Edinburgh has, however, been priced in the form required by the orders issued under the Act of 1891, the

largest local auctioneers there and at Perth intimating their inability to class the stock sold according to quality as is done elsewhere in Great Britain.

Turning to the prices quoted in these returns, the subjoined table gives, for the same markets as were selected in the preceding months of the current year, the numbers of the transactions in each grade of stock and the prices per live stone and per live cwt. respectively :—

PLACES.	INFERIOR or Third Quality.			GOOD or Second Quality.			PRIME or First Quality.		
	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.
		<i>s. d.</i>	<i>s. d.</i>		<i>s. d.</i>	<i>s. d.</i>		<i>s. d.</i>	<i>s. d.</i>
Carlisle - - -	588	3 2½	25 6	733	3 8½	29 10	555	4 1½	32 10
Leeds - - -	2	3 6	28 0	39	3 7½	29 0	439	4 0	32 0
Liverpool - - -	91	3 0½	24 2	20	3 6	28 0	457	4 1	32 8
London - - -	7	2 11½	23 8	557	4 1½	32 10	623	4 6½	36 6
Newcastle - - -	22	3 2½	25 8	142	3 9	30 0	870	4 1½	32 10
Shrewsbury - - -	—	—	—	—	—	—	—	—	—
Aberdeen - - -	1,147	3 0½	24 2	2,881	3 11½	31 8	1,822	4 3½	34 4
Dundee - - -	272	3 4	26 8	2,251	3 10½	30 10	1,313	4 2	33 4
Edinburgh - - -	—	—	—	2,931	4 1½	32 10	424	4 2½	33 6
Falkirk - - -	63	3 8	29 4	379	4 0½	32 4	428	4 3	34 0
Glasgow - - -	410	3 10½	31 2	987	4 0½	32 2	1,353	4 3½	34 2
Perth - - -	178	3 9	30 0	674	4 0½	32 2	365	4 4	34 8

It will be seen that the failure of the town of Shrewsbury to report any prices for fat stock weighed and sold leaves that market a blank as regards information which has been formerly available. This is perhaps the more remarkable, as the reports received from Shrewsbury indicate that there is there an exceptional use of the weighbridge for the sale of store stock, of which 643 were weighed and priced out of a total of no more than 670 in Great Britain in the second quarter of 1898. The table also shows that the number of cases where inferior stock were weighed and priced is still relatively very small in all the markets except Aberdeen and Carlisle, and, as has been before observed, the prices quoted for inferior stock at Glasgow and at Perth seem to suggest that some different method of classification may be adopted locally from the usual practice elsewhere.

Contrasting the prices of the last three months ending June 30th with those in the same period of 1897, the values, where comparisons are possible, are nearly everywhere

lower, the drop in some instances, and more particularly in London, being considerable, as the following figures show:—

PLACES.	INFERIOR OR Third Quality.		GOOD OR Second Quality.		PRIME OR First Quality.	
	1898.	1897.	1898.	1897.	1898.	1897.
	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.
Carlisle - -	25 6	—	29 10	—	32 10	—
Leeds - -	28 0	28 0	29 0	29 0	32 0	32 4
Liverpool - -	24 2	25 10	28 0	30 10	32 8	34 0
London - -	23 8	31 0	32 10	36 10	36 6	40 4
Newcastle - -	25 8	27 8	30 0	33 0	32 10	36 6
Shrewsbury - -	—	24 8	—	30 6	—	34 10
Aberdeen - -	24 2	25 6	31 8	33 0	34 4	36 2
Dundee - -	26 8	29 0	30 10	32 6	33 4	34 10
Edinburgh - -	—	—	32 10	34 10	33 6	35 8
Falkirk - -	29 4	—	32 4	—	34 0	—
Glasgow - -	31 2	33 2	32 2	34 0	34 2	36 0
Perth - -	30 0	32 10	32 2	34 10	34 8	36 4

The range of values for the second quarter of 1898 in the two superior grades, in which the transactions quoted are fairly numerous, gives a price of from 28s. per cwt. at Liverpool to 32s. 10d. per cwt. at London and Edinburgh for second quality cattle, and one of from 32s. per cwt. at Leeds to 36s. 6d. per cwt. in London for prime stock.

Fat cattle to the number of over 3,000 head were reported to have been sold at an agreed on price per cwt. of live weight at 7 of the 21 markets during the quarter. Of these quotations only 137, however, came from English markets, and more than two-thirds of the whole were supplied from Falkirk and Glasgow. In these last markets the value per live cwt. of second quality stock thus sold was quoted as 32s. 4d. and 31s. 10d., and of prime cattle 34s. and 34s. 2d. respectively.

The development recorded in this section of the returns is the most hopeful indication of an increasing appreciation of this method of sale yet reported, as the number of actual live weight transactions is half as great again as in the first three months of the current year, when 2,090 such transactions were returned.

The customary table, giving the numbers of stock and the extent of the use of the weighbridge at each of the 21 scheduled places, is added for reference.

Cattle, Sheep, and Swine, entering the Markets and Marts of the undermentioned Places, with the Number Weighed, as received from the Market Authorities in the **Second Quarter** of 1898, under the Markets and Fairs (Weighing of Cattle) Act, 1891 (54 & 55 Vict. c. 70).

PLACES.	Cattle.			Sheep.			Swine.		
	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.
ENGLAND.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Ashford - - -	3,420	105	—	29,484	—	—	3,238	—	—
Birmingham - -	10,438	8	8	25,042	—	—	31,230	—	—
Bristol - - -	17,362	72	47	37,769	—	—	—	—	—
Carlisle - - -	19,596	1,876	1,876	82,683	—	—	3,641	—	—
Leicester - - -	18,762	153	127	20,852	—	—	1,017	4	4
Leeds - - -	8,718	480	480	38,900	2,338	2,338	1,090	—	—
Lincoln - - -	2,750	13	11	20,216	—	—	2,805	9	9
Liverpool - - -	8,959	568	568	79,758	1,502	1,502	—	—	—
London - - -	16,290	2,784	1,187	162,310	1,949	—	290	—	—
Newcastle-upon-Tyne	23,454	1,034	1,034	74,638	—	—	7,534	151	151
Norwich - - -	32,271	139	2	62,788	—	—	7,226	—	—
Salford - - -	26,417	190	—	156,698	524	—	252	—	—
Shrewsbury - -	12,960	731	643	14,652	—	—	2,968	3	3
Wakefield - -	19,876	334	—	78,925	737	—	1,511	44	—
York - - -	21,084	—	—	25,436	—	—	905	—	—
SCOTLAND.									
Aberdeen - - -	14,841	5,850	5,850	58,431	6,341	6,341	4,531	—	—
Dundee - - -	5,030	3,903	3,840	7,689	1,011	999	556	—	—
Edinburgh - -	19,173	7,191	*3,378	74,613	—	—	1,964	—	—
Falkirk - - -	3,938	870	870	1,551	—	—	29	—	—
Glasgow - - -	17,720	2,968	2,750	72,145	199	154	2,104	3	—
Perth - - -	20,310	4,215	*1,217	75,452	2,008	2,008	3,869	84	84
TOTAL for ENGLAND	242,357	8,487	5,983	910,151	7,050	3,840	63,707	211	167
TOTAL for SCOTLAND	81,012	24,997	*17,905	289,881	9,559	9,502	13,053	87	84
Total - -	323,369	33,484	*23,888	1,200,032	16,609	13,342	76,760	298	251

* Prices for 3,770 cattle in addition to the above were quoted from Edinburgh, and for 2,998 cattle from Perth, but without distinguishing the quality.

PRICES OF MEAT, CORN, AND DAIRY PRODUCE.

AVERAGE PRICES of DEAD MEAT, per Stone of 8 lbs., at the LONDON CENTRAL MEAT MARKET, during the second Quarter, and during the Months of June, July, and August, 1898.

(Compiled from the prices quoted weekly in the "Meat Trades Journal.")

DESCRIPTION.	2ND QUARTER 1898.	JUNE, 1898.	JULY, 1898.	AUGUST, 1898.
	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
BEEF :—				
Scotch, short sides - - -	3 11 to 4 2	4 0 to 4 3	4 1 to 4 5	3 11 to 4 3
„ long sides - - -	3 7 „ 3 9	3 8 „ 3 10	— —	3 8 „ 3 10
English - - - - -	3 6 „ 3 8	3 6 „ 3 8	3 7 „ 3 9	3 7 „ 3 10
Cows and Bulls - - -	1 11 „ 2 7	2 1 „ 2 7	2 0 „ 2 5	2 1 „ 2 7
American, Birkenhead killed -	3 1 „ 3 4	3 1 „ 3 5	3 4 „ 3 7	3 1 „ 3 4
„ Deptford killed -	3 1 „ 3 4	3 1 „ 3 5	3 4 „ 3 7	3 1 „ 3 4
Argentine „ „ - - -	2 5 „ 2 10	2 5 „ 2 10	2 10 „ 3 2	2 6 „ 2 10
American Refrig. hind-qrs -	3 5 „ 3 8	3 5 „ 3 8	3 9 „ 4 0	3 7 „ 3 10
„ „ fore-qrs - - -	2 1 „ 2 3	1 11 „ 2 1	2 2 „ 2 5	1 11 „ 2 1
Australian, Frozen hind-qrs -	1 11 „ 2 2	1 9 „ 1 11	1 7 „ 1 10	1 7 „ 1 9
„ „ fore-qrs - - -	1 7 „ 1 8	1 3 „ 1 5	1 3 „ 1 4	1 1 „ 1 3
New Zealand „ hind-qrs -	2 3 „ 2 4	2 0 „ 2 1	1 10 „ 2 0	1 11 „ 2 1
MUTTON :—				
Scotch, Prime - - - -	4 0 „ 4 7	4 1 „ 4 8	4 2 „ 4 9	4 2 „ 4 9
English, Prime - - - -	3 8 „ 4 5	3 9 „ 4 5	3 8 „ 4 5	3 8 „ 4 3
Ewes - - - - -	2 9 „ 3 3	2 9 „ 3 3	2 9 „ 3 2	2 10 „ 3 3
Continental - - - -	3 11 „ 4 3	3 10 „ 4 3	3 5 „ 4 0	3 3 „ 3 10
River Plate, Town killed -	2 10 „ 3 1	2 11 „ 3 1	3 1 „ 3 4	3 2 „ 3 5
New Zealand, Frozen - - -	1 9 „ 2 8	1 8 „ 2 8	1 9 „ 2 9	1 8 „ 2 7
Australian, Frozen - - -	1 8 „ 1 10	1 6 „ 1 9	1 6 „ 1 9	1 7 „ 1 9
River Plate, Frozen - - -	1 8 „ 1 10	1 6 „ 1 8	1 6 „ 1 8	1 8 —
LAMB :—				
English - - - - -	5 5 „ 6 6	5 0 „ 6 0	4 8 „ 5 6	4 5 „ 5 3
New Zealand, Frozen - - -	2 7 „ 2 11	2 8 „ 3 0	2 10 „ 3 0	2 11 „ 3 3
VEAL :—				
English - - - - -	4 2 „ 4 7	4 0 „ 4 5	3 10 „ 4 2	3 10 „ 4 5
Foreign - - - - -	3 6 „ 4 0	3 5 „ 3 10	3 4 „ 3 9	3 3 „ 3 8
PORK :—				
English, best - - - -	3 11 „ 4 4	3 8 „ 4 0	3 5 „ 3 9	3 9 „ 4 1
„ secondary - - - -	3 5 „ 3 10	3 4 „ 3 8	3 1 „ 3 5	3 4 „ 3 8
Foreign - - - - -				

AVERAGE WHOLESALE PRICES of CATTLE and SHEEP, per Stone of 8 lbs., sinking the offal, at the METROPOLITAN CATTLE MARKET, during the undermentioned Quarters of 1897 and 1898.

PERIOD.	CATTLE.			SHEEP.		
	Inferior.	Second.	First.	Inferior.	Second.	First.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
2nd Quarter, 1897	2 5	4 0	4 7	3 10	4 11	5 8
3rd Quarter „	2 4	4 0	4	3 7	5 0	5 8
4th Quarter „	2 4	3 10	4 5	3 4	4 11	5 7
1st Quarter, 1898	2	3 9	4 4	3 4	5 1	5 9
2nd Quarter „	2 4	3 7	4 2	2 10	4 5	5 2

AVERAGE WHOLESALE PRICES OF BEEF and MUTTON, per Stone of 8 lbs., by the Carcase, at LIVERPOOL and GLASGOW, during the undermentioned Quarters of 1897 and 1898.

PERIOD.	LIVERPOOL.*			GLASGOW.†			
	BEEF.		MUTTON.	BEEF.		MUTTON.	
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
2nd Quarter, 1897	2 8 to 3 6	2 8 to 5 4		2 8 to 4 0	3 4 to 4 10		
3rd Quarter „	2 8 „ 3 8	3 4 „ 4 8		2 4 „ 3 8	3 4 „ 4 4		
4th Quarter „	2 0 „ 3 5	2 10 „ 4 10		2 4 „ 3 8	3 0 „ 4 6		
1st Quarter, 1898	2 0 „ 3 6	3 4 „ 4 8		2 4 „ 3 8	3 0 „ 4 8		
2nd Quarter „	2 4 „ 3 2	3 8 „ 4 10		2 8 „ 3 6	3 4 „ 4 8		

* Compiled from information furnished by the Medical Officer of Health, Liverpool. The prices quoted are for Carcases of Animals *slaughtered at the Liverpool Abattoir*, and do not apply to Imported Meat.

† Compiled from information furnished by the Principal of the Veterinary College, Glasgow.

BERLIN MARKET.

AVERAGE PRICES of CATTLE and SHEEP (First Quality Dead Weight) in the BERLIN CATTLE MARKET in the under-mentioned Months of 1898.

MONTHS.	CATTLE.		SHEEP.	
	Per Cwt.		Per Cwt.	
1898.	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>
June - - - -	59	10 to 63	60	10 to 62
July - - - -	61	5 „ 65	62	1 „ 64
August - - - -				

NOTE.—The above prices have been compiled from the weekly returns published in the *Deutsche Landwirthschaftliche Presse*.

PARIS MARKET.

AVERAGE PRICES of CATTLE, SHEEP, and SWINE (Medium Quality) in the PARIS CATTLE MARKET in the under-mentioned Months of 1898.

MONTHS.	OXEN.		CALVES.		SHEEP.		PIGS.	
	Per Cwt.		Per Cwt.		Per Cwt.		Per Cwt.	
LIVE WEIGHT.								
1898.	<i>s.</i> <i>d.</i>		<i>s.</i> <i>d.</i>		<i>s.</i> <i>d.</i>		<i>s.</i> <i>d.</i>	
June - -	33	6	38	8	35	8	44	2
July - -	32	6	39	11	35	2	47	0
August - -	31	3	41	4	34	7	43	2
DEAD WEIGHT.								
1898.	<i>s.</i> <i>d.</i>		<i>s.</i> <i>d.</i>		<i>s.</i> <i>d.</i>		<i>s.</i> <i>d.</i>	
June - - -	52	9	68	3	71	6	63	1
July - - -	51	1	67	7	69	9	67	0
August - - -	48	1	70	5	67	2	61	11

NOTE.—The above prices have been compiled from the weekly returns published in the *Journal d'Agriculture Pratique*.

CHICAGO

PRICES of CATTLE at CHICAGO per Cwt. (Live Weight) in the under-mentioned Months of 1898

Months.	Good Dressed Beef and Shipping Steers.				Export Cattle.				Extra Prime Cattle.						
1898.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.			
June - -	20	1	to	23	10	19	7	to	23	10	23	10	to	25	2
July - -	22	2	„	24	3	21	6	„	24	6	24	6	„	25	8
August - -	22	2	„	25	5	22	2	„	25	2	24	6	„	26	10

Compiled from the Live Stock Reports issued by Messrs. Clay, Robinson, and Co., of the Union Stock Yards, Chicago, Illinois.

AVERAGE VALUES, per Cwt., of various Kinds of DEAD MEAT Imported into the United Kingdom from FOREIGN COUNTRIES and BRITISH POSSESSIONS in the under-mentioned Quarters of 1897 and 1898.

(Computed from the Trade and Navigation Accounts.)

PERIOD.	BEEF.		MUTTON.	PORK.		BACON.	HAMS.
	Fresh.	Salted.	Fresh.	Fresh.	Salted.		
2nd Quarter, 1897 -	<i>s. d.</i> 40 1	<i>s. d.</i> 23 10	<i>s. d.</i> 32 0	<i>s. d.</i> 43 11	<i>s. d.</i> 20 10	<i>s. d.</i> 35 11	<i>s. d.</i> 43 5
3rd Quarter ,, -	37 2	24 7	30 9	43 3	20 3	35 10	43 5
4th Quarter ,, -	37 7	24 9	30 5	43 7	21 2	36 9	41 2
1st Quarter, 1898 -	40 8	25 11	28 10	42 11	25 10	34 6	39 9
2nd Quarter, ,, -	39 3	26 9	29 8	41 10	22 9	36 5	39 2

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels,* computed from the Weekly Averages of Corn Returns from the 196 Returning Markets of ENGLAND AND WALES, pursuant to the Corn Returns Act, 1882, together with the QUANTITIES returned as sold at such Markets, in the under-noted periods of the Years 1898, 1897, and 1896.

QUARTER ENDED	PRICES.			QUANTITIES.		
	1898.	1897.	1896.	1898.	1897.	1896.
Wheat.						
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
Lady Day - - -	35 1	29 7	25 8	699,657	619,679	448,047
Midsummer - - -	41 5	27 6	25 2	557,504	619,618	384,559
Michaelmas - - -	—	30 4	23 7	—	635,698	505,988
Christmas - - -	—	33 3	30 5	—	881,566	772,427
Barley.						
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
Lady Day - - -	27 9	24 0	22 5	902,452	784,713	955,902
Midsummer - - -	26 10	21 4	21 4	47,621	78,488	92,739
Michaelmas - - -	—	21 6	21 0	—	118,875	165,722
Christmas - - -	—	27 0	27 1	—	2,275,111	2,177,499
Oats.						
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
Lady Day - - -	17 5	16 4	13 9	226,150	194,193	259,565
Midsummer - - -	19 10	17 3	14 3	93,475	79,707	99,672
Michaelmas - - -	—	17 10	14 6	—	75,824	94,383
Christmas - - -	—	16 5	16 7	—	200,710	201,533

* Section 8 of the Corn Returns Act, 1882, provides that where returns of purchases of British Corn are made to the local inspector of Corn Returns in any other measure than the imperial bushel or by weight or by a weighed measure, that officer shall convert such returns into the imperial bushel, and in the case of weight or weighed measure the conversion is to be made at the rate of 60 imperial pounds for every bushel of wheat, 50 imperial pounds for every bushel of barley, and 30 imperial pounds for every bushel of oats.

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Returns received under the Corn Returns Act, 1882, in each of the under-mentioned Weeks in 1898, and in the corresponding Weeks in 1897 and 1896.

Weeks ended (<i>in 1898</i>).	Wheat.			Barley.			Oats.		
	1898.	1897.	1896.	1898.	1897.	1896.	1898.	1897.	1896.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Jan. 1 -	34 6	30 6	25 2	27 3	24 8	24 7	17 1	16 2	13 10
" 8 -	34 11	31 1	25 4	27 9	25 5	23 11	16 10	16 3	13 9
" 15 -	35 0	31 8	25 10	27 8	24 10	23 6	17 4	16 5	13 11
" 22 -	34 11	31 7	26 1	27 10	25 5	23 7	17 5	16 6	13 10
" 29 -	34 6	31 3	26 3	27 8	24 7	23 1	17 2	16 8	14 1
Feb. 5 -	34 10	30 7	26 4	28 0	24 10	22 5	17 6	16 7	14 0
" 12 -	35 1	29 8	26 7	27 8	24 8	21 11	17 5	16 6	14 0
" 19 -	35 0	28 11	26 3	27 11	23 9	21 10	17 8	16 5	13 9
" 26 -	35 5	28 2	25 6	27 6	23 8	21 10	17 10	16 3	13 10
Mar. 5 -	35 10	28 3	25 4	28 0	23 0	21 5	17 11	16 3	13 8
" 12 -	35 8	27 11	25 5	27 10	22 11	21 3	17 9	16 2	13 10
" 19 -	35 6	27 11	25 1	28 0	22 8	21 1	17 10	16 2	13 9
" 26 -	35 4	27 9	24 10	28 6	22 5	21 4	17 8	16 3	13 4
Apl. 2 -	35 3	27 10	24 7	27 11	22 3	21 10	17 10	16 3	13 3
" 9 -	35 2	27 8	24 6	27 0	22 7	21 0	17 11	16 6	13 1
" 16 -	35 3	27 0	24 11	28 0	23 0	23 6	18 2	16 3	14 0
" 23 -	36 1	26 6	25 6	28 3	20 7	21 0	18 4	16 7	13 11
" 30 -	38 4	27 9	25 8	27 10	20 5	22 6	18 11	17 3	14 3
May 7 -	42 4	28 4	25 7	27 8	21 5	21 0	20 4	16 11	14 4
" 14 -	45 11	27 11	25 7	27 1	20 2	21 0	21 1	17 7	14 5
" 21 -	48 1	28 1	25 6	26 0	19 10	21 8	21 3	17 9	14 6
" 28 -	47 9	28 2	25 4	26 5	21 3	21 5	21 5	17 10	14 10
June 4 -	46 3	27 10	25 5	26 10	20 8	21 6	21 0	17 9	14 8
" 11 -	45 4	27 4	25 1	25 8	22 8	19 3	20 11	17 11	14 9
" 18 -	42 4	27 0	25 1	26 1	23 9	22 8	20 5	18 0	15 1
" 25 -	40 8	27 0	24 10	24 3	19 9	19 5	20 7	18 6	14 10
July 2 -	38 3	27 1	24 9	23 4	18 10	16 2	20 8	18 7	15 0
" 9 -	36 10	27 4	24 7	25 0	17 4	18 11	20 5	18 8	14 9
" 16 -	37 1	27 7	24 2	24 1	17 6	18 3	20 10	18 3	15 4
" 23 -	38 1	28 1	24 0	25 0	18 10	19 8	20 10	18 11	15 0
" 30 -	36 11	28 10	23 8	24 2	17 10	19 7	20 11	19 0	14 10
Aug. 6 -	35 7	29 5	23 6	26 11	17 9	19 5	20 7	18 11	14 9
" 13 -	33 8	29 8	22 11	27 5	19 0	21 1	20 9	17 4	14 6
" 20 -	32 7	30 4	22 4	24 4	19 2	21 11	19 11	17 2	14 3
" 27 -	30 7	31 8	22 5	27 6	22 5	21 10	19 3	17 1	13 7
Sept. 3 -	28 1	33 7	23 1	27 8	25 11	21 11	18 11	17 0	13 11
" 10 -	26 10	33 1	23 9	27 9	27 4	23 4	17 10	17 3	14 1
" 17 -	25 7	33 10	24 0	26 10	28 11	24 8	16 10	17 0	14 6
" 24 -		33 11	24 4		29 7	26 3		16 8	14 1
Oct. 1 -		33 4	25 2		29 10	28 7		16 4	14 9
" 8 -		32 1	26 7		28 9	29 5		16 0	15 3
" 15 -		31 10	27 10		28 3	29 7		16 1	15 9
" 22 -		32 2	28 11		27 5	28 6		16 2	16 0
" 29 -		32 10	30 9		27 5	28 3		16 0	17 3
Nov. 5 -		33 5	31 6		26 10	27 5		16 5	17 6
" 12 -		34 0	31 9		26 3	27 3		16 3	17 7
" 19 -		33 11	32 11		26 2	26 8		16 5	17 7
" 26 -		33 8	33 4		25 9	26 9		16 8	17 7
Dec. 3 -		33 9	32 8		25 10	26 2		16 9	17 0
" 10 -		33 9	32 2		26 0	25 4		16 6	16 8
" 17 -		34 1	31 3		26 4	24 10		17 0	16 7
" 24 -		34 4	30 9		26 11	24 1		17 0	16 1

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in BELGIUM in the under-mentioned Months of 1898.

Month.	Wheat.	Barley.	Oats.
1898.	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
June - - - - -	43 7	23 7	20 6
July - - - - -	40 0	21 7	20 9
August - - - - -			

The above prices have been compiled from the official monthly averages published in the *Moniteur Belge*.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in FRANCE, and ENGLAND and WALES in the under-mentioned Months of 1898.

MONTH.	FRANCE.	ENGLAND.
WHEAT.		
1898.	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>
June - - - - -	50 9	43 7
July - - - - -	46 10	37 5
August - - - - -	40 2	33 1
BARLEY.		
1898.	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>
June - - - - -	26 7	25 8
July - - - - -	25 8	24 3
August - - - - -	23 11	26 6
OATS.		
1898.	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>
June - - - - -	22 11	20 8
July - - - - -	22 7	20 8
August - - - - -	21 4	20 1

Note.—The prices of French grain have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*. The prices of British grain are official averages based on the weekly returns furnished under the Corn Returns Act, 1882.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per
IMPERIAL QUARTER at the under-mentioned Markets in
the under-mentioned Months of 1898.

Month.	London.	Paris.	Breslau.
WHEAT.			
1898.	Per Qr. s. d.	Per Qr. s. d.	Per Qr. s. d. s. d.
June - - -	44 11	50 6	37 7 to 44 9
July - - -	38 1	46 8	37 5 „ 44 7
August - - -	32 2	40 2	33 11 „ 39 7
BARLEY.			
1898.	Per Qr. s. d.	Per Qr. s. d.	Per Qr. s. d. s. d.
June - - -	25 0	26 10	25 3 to 28 10
July - - -	25 11	27 3	24 4 „ 27 11
August - - -	27 4	24 3	22 5 „ 26 0
OATS.			
1898.	Per Qr. s. d.	Per Qr. s. d.	Per Qr. s. d. s. d.
June - - -	22 5	24 0	22 7 to 23 6
July - - -	22 0	23 10	22 7 „ 23 5
August - - -	20 11	23 0	18 10 „ 21

Note.—The London quotation represents the price of British corn as returned under the Corn Returns Act, 1882; the price of grain in Paris is the official average price of French wheat in that city; the quotations shown for Breslau represent the prices of grain of good merchantable quality.

PRICES OF WOOL.

PRICES OF ENGLISH WOOL, per pack of 240 lbs., in the
under-mentioned Months of 1898.

(Compiled from the *Economist*.)

DESCRIPTION.	June.	July.	August.
South Down - - -	£ s. £ s. 8 0 to 9 0	£ s. £ s. 8 0 to 9 0	£ s. £ s. 8 0 to 9 0
Half breds - - -	7 15 „ 8 10	7 15 „ 8 10	7 15 „ 8 10
Leicester - - -	7 15 „ 8 10	7 15 „ 8 10	7 15 „ 8 10
Kent Fleeces - - -	7 10 „ 8 10	7 10 „ 8 10	7 10 „ 8 10

III.—PRICES OF BUTTER, MARGARINE, AND CHEESE.
 MEAN WHOLESALE PRICES of BUTTER, MARGARINE, and
 CHEESE in the under-mentioned Months of 1898.

(Compiled from the *Grocer*.)

DESCRIPTION.	June. 1898.		July. 1898.		August. 1898.	
	Per Cwt.		Per Cwt.		Per Cwt.	
	s.	d.	s.	d.	s.	d.
BUTTER :						
Cork, 1sts - -	78	0	77	0	78	0
„ 2nds - -	77	0	74	6	74	0
„ 3rds - -	76	0	72	6	73	0
„ 4ths - -	71	6	70	0	67	0
Friesland - -	78	0 to 80	78	0 to 80	86	0 to 88
Dutch Factories - -	80	0 „ 82	80	0 „ 81	88	0 „ 90
French Baskets - -	88	6 „ 94	87	0 „ 94	98	0 „ 100
„ Crocks and Firkins - -	81	6 „ 85	81	0 „ 85	90	0 „ 96
„ 2nds and 3rds - -	75	6 „ 79	75	0 „ 79	78	6 „ 86
Danish and Swedish - -	87	0 „ 91	87	0 „ 90	95	0 „ 97
Finnish - -	76	6 „ 82	76	0 „ 82	81	6 „ 89
Russian - -	71	0 „ 80	70	6 „ 80	77	6 „ 85
Canadian and States - -	72	6 „ 87	68	0 „ 86	69	0 „ 94
Argentine - -	90	0 „ 94	—	—	—	—
Fresh Rolls (Foreign) per doz. - -	8	6 „ 12	8	6 „ 12	9	6 „ 13
MARGARINE :						
Margarine - -	30	0 „ 56	29	6 „ 56	28	0 „ 56
Mixtures - -	48	0 „ 76	47	6 „ 75	46	0 „ 74
CHEESE :						
Cheddar - -	44	6 „ 72	39	0 „ 69	37	0 „ 62
Somerset - -	48	0 „ 64	47	0 „ 63	44	0 „ 60
Cheshire - -	—	—	—	—	65	0 „ 70
Wiltshire - -	56	0 „ 58	54	6 „ 59	56	0 „ 60
Double Gloucester - -	38	0 „ 50	35	0 „ 46	34	6 „ 48
Derby - -	42	6 „ 47	38	6 „ 41	39	6 „ 42

WEEKLY PRICES (WHOLESALE) of VEGETABLES and FRUIT
at COVENT GARDEN MARKET.

(Compiled from the *Gardeners' Chronicle*.)

	Week ending							
	4th August.		11th August.		13th August.		25th August.	
VEGETABLES—	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Artichokes, Globe, per dozen	0	to 1 6	0	9 to 1 6	1	to 2 6	1	6 to 2 6
Beans, English, Dwarf, per bushel	—	—	4	0 —	4	0 —	2	0 —
Beans, Scarlet, per bushel	5	0 „ 0	3	6 „ 4 0	3	0 „ 3 6	1	6 „ 2 0
Beans, Broad, per bushel	1	0 „ 1 6	1	0 „ 1 6	1	0 „ 1 6	1	0 —
Beetroots, per dozen bunches	3	0 „ 4 0	3	0 „ 4 0	3	0 „ 4 0	3	0 „ 4 0
Cabbage, open, per tally	3	0 „ 5 0	3	0 „ 5 0	4	0 „ 6 0	4	0 „ 6 0
Carrots, New, per dozen bunches	1	6 „ 3 0	0	9 „ 1 3	1	0 „ 1 3	1	0 —
Cauliflowers, English per dozen	2	0 „ 3 0	1	0 „ 1 6	1	0 „ 1 6	1	0 „ 1 6
Celery, New, per bundle	1	0 „ 1 6	1	0 „ 1 6	1	0 „ 1 3	1	0 „ 1 3
Cucumbers, per dozen	2	0 „ 3 0	2	0 „ 0	1	6 „ 3 0	1	6 „ 3 0
Horseradish, New English, per dozen	3	0 —	2	6 „ 3 0	2	6 „ 3 0	2	6 „ 3 0
Lettuce Cabbage, per dozen	1	0 „ 1 6	1	0 „ 1 6	1	0 „ 1 6	1	6 —
Marrows, Vegetable, per dozen	1	0 „ 1 6	0	9 „ 1 6	1	0 „ 2 0	1	0 „ 2 0
Mushrooms, per lb.	0	10 „ 1 0	0	6 „ 1 0	0	3 „ 0 6	0	6 „ 1 0
Onions, Dutch, per bag	4	6 „ 5 0	3	6 „ 4 6	3	0 „ 3 6	3	0 —
Onions, Green, per dozen bunches	2	0 „ 4 0	1	6 „ 3 0	1	6 „ 3 0	1	6 —
Parsley, per sieve	1	0 —	1	0 —	1	0 —	1	0 —
Peas, per bushel	3	6 „ 6 0	3	0 „ 4 0	3	0 „ 3 6	2	6 „ 4 0
Potatoes, Bedfords, per ton	60	0 „ 80 0	60	0 „ 90 0	60	0 „ 90 0	50	0 „ 80 0
Potatoes, Kent, Kidneys, per bushel	4	0 „ 5 0	4	0 —	2	6 —	2	6 —
Radishes, Round, per dozen bunches	1	3 —	1	3 —	1	3 —	1	3 —
Salad, Small, per dozen punnets	1	3 —	1	3 —	1	3 —	1	3 —
Shallots, good, per cwt.	14	0 —	12	0 „ 14 0	12	0 —	12	0 —
Spinach, per half bushel	1	3 „ 1 6	1	0 —	1	0 —	1	0 —
Tomatoes, English, per lb.	0	3 „ 0 4	0	3 „ 0 4	0	3 „ 0 4	0	3 —
Tomatoes, Channel Isles, per lb.	0	3 —	0	2 „ 0 3	0	2 „ 0 2	0	2 —
Turnips, New English, per dozen	3	0 „ 5 0	3	0 „ 5 0	2	0 „ 4 0	2	0 „ 3 0
Watercress, per dozen bunches	0	4 „ 0 8	0	4 „ 0 3	0	4 „ 0 8	0	4 „ 0 6
FRUIT—								
Apples, Keswicks, per bushel	2	3 „ 2 6	2	0 —	2	0 —	3	6 „ 4 0
Apples, Suffields, per bushel	—	—	6	0 —	6	0 —	5	0 „ 6 0
Apples, Quarrendens, per sieve	—	—	5	0 —	5	0 —	5	0 „ 6 0
Currants, black, per sieve	5	0 „ 6 0	5	0 „ 6 0	4	0 „ 5 0	—	—
Currants, red, per sieve	2	6 „ 4 6	2	6 „ 5 0	2	6 „ 3 6	—	—
Grapes, English Hamburg, per lb.	1	0 „ 1 6	1	6 „ 2 0	1	6 „ 2 0	1	3 „ 1 6
Grapes, Belgian, per lb.	0	6 —	0	6 —	0	6 —	0	6 —
Grapes, Channel Isles, per lb.	0	9 —	0	9 —	0	6 „ 0 9	0	6 „ 0 8
Grapes, Muscat, per lb.	2	0 „ 2 6	1	3 „ 2 6	1	3 „ 2 6	1	3 „ 2 6
Greengages, English, per sieve	—	—	—	—	5	0 „ 7 0	3	6 „ 5 0
Greengages, Foreign, per sieve	—	—	5	0 „ 8 0	7	0 „ 10 0	3	6 „ 5 0
Melons, each	1	0 „ 1 9	1	0 „ 1 6	1	0 „ 2 0	1	0 „ 1 6
Nectarines, per dozen	6	0 „ 8 0	8	0 „ 12 0	8	0 „ 12 0	8	0 „ 12 0
Peaches, per dozen	6	0 „ 8 0	8	0 „ 12 0	8	0 „ 12 0	8	0 „ 12 0
Pears, Williams, per case	—	—	—	—	—	—	4	6 —
Pines, each	3	0 „ 5 0	2	3 „ 5 0	1	4 „ 5 0	—	—
Pines, Queens	6	0 —	6	0 —	6	0 —	—	—

DISEASES OF ANIMALS IN GREAT BRITAIN.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Board of Agriculture, in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUTBREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUTBREAKS Confirmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	No.	No.	No.	No.
March, 1897 -	2	14	450	785	13,544
June, 1897 -	3	25	197	700	13,131
September, 1897 -	1	4	71	392	8,026
December, 1897 -	1	3	23	278	5,731
March, 1898 -	1	1	220	578	11,466
June, 1898 -	—	—	—	879	15,352

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax** and **Glanders** in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).	
	OUTBREAKS Reported.	ANIMALS Attacked.	OUTBREAKS Reported.	ANIMALS Attacked.
	No.	No.	No.	No.
March, 1897 -	129	306	196	341
June, 1897 -	109	201	230	393
September, 1897 -	93	171	249	437
December, 1897 -	102	204	225	458
March, 1898 -	156	245	197	381
June, 1898 -	169	254	195	337

NUMBER OF CASES of **Rabies** in DOGS in GREAT BRITAIN during each of the under-mentioned periods.

THREE MONTHS ENDED	Number of Cases.
31st March, 1897 -	48
30th June, 1897 -	42
30th September, 1897 -	40
31st December, 1897 -	21
31st March, 1898 -	8
30th June, 1898 -	6

DISEASES OF ANIMALS IN IRELAND.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Lord Lieutenant and Privy Council in IRELAND, in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUT- BREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUT- BREAKS Con- firmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
March, 1897 -	—	—	142	122	1,149
June, 1897 -	—	—	—	136	1,571
September, 1897 -	—	—	—	120	749
December, 1897 -	—	—	—	38	655
March, 1898 -	—	—	—	81	1,039
June, 1898 -	—	—	—	97	1,225

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax**, **Glanders**, and **Rabies** in Ireland in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).		Rabies.	
	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	CASES REPORTED.	
					DOGS.	OTHER ANIMALS.
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
March, 1897 -	—	—	—	—	118	19
June, 1897 -	1	1	1	2	139	41
Sept., 1897 -	—	—	1	1	110	29
Dec., 1897 -	—	—	—	—	26	16
March, 1898 -	1	8	—	—	13	2
June, 1898 -	—	—	1	1	28	11

PRELIMINARY STATEMENT compiled from the Returns collected on the 4th June, 1898, showing the ACREAGE under HOPS in each COUNTY OF ENGLAND in which Hops were grown, with a COMPARATIVE STATEMENT for the years 1897, 1896, and 1895.

COUNTIES.	1898.	1897.	1896.	1895.
	Acres.	Acres.	Acres.	Acres.
BERKS - - - - -	—	—	4	—
GLOUCESTER - - - - -	40	40	49	38
HANTS - - - - -	2,263	2,306	2,494	2,875
HEREFORD - - - - -	6,651	6,542	6,895	7,553
KENT - - - - -	30,941	31,661	33,300	35,018
MONMOUTH - - - - -	2	2	—	—
SALOP - - - - -	126	129	140	150
SUFFOLK - - - - -	3	2	4	10
SURREY - - - - -	1,313	1,416	1,623	1,783
SUSSEX - - - - -	4,829	5,174	5,908	7,489
WORCESTER - - - - -	3,567	3,591	3,800	4,024
Total - - - - -	49,735	50,863	54,217	58,940

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LIST OF LEAFLETS ISSUED BY THE BOARD OF AGRICULTURE.

Number.	Title.
Leaflet No. 1	Mites on Currant and Nut Trees.
" " 2	Vine and Raspberry Weevils.
" " 3	The Turnip Fly or Flea.
" " 4	Caterpillars on Fruit Trees.
" " 5	The Mangel Wurzel Fly.
" " 6	The Field Vole.
" " 7	Autumn Catch Crops and Fodder Supply.
" " 8	Farmers and Assessments to Local Rates.
" " 9	Ensilage.
" " 10	Wireworms.
" " 11	The Daddy Longlegs.
" " 12	The Gooseberry Saw-Fly.
" " 13	Acorn Poisoning.
" " 14	The Raspberry Moth.
" " 15	The Apple Blossom Weevil.
" " 16	The Apple Sucker.
" " 17	Preservation of Commons.
" " 18	Fertilisers and Feeding Stuffs Act.
" " 19	Pea and Bean Weevil.
" " 20	The Magpie Moth.
" " 21	The Warble Fly.
" " 22	The Diamond Back Moth.
" " 23	Potato Disease.
" " 24	The Ribbon Footed Corn-Fly.
" " 25	The Cockchafer.
" " 26	Farmers and the Income Tax.
" " 27	Remission of Tithe Rentcharge.
" " 28	Anthrax.
" " 29	Swine Fever.
" " 30	The Codlin Moth.
" " 31	The Onion Fly.
" " 32	Foul Brood or Bee Pest.
" " 33	Surface Caterpillars.
" " 34	The Woolly Aphis or American Blight.
" " 35	The Celery Fly.
" " 36	Cultivation of Osiers.
" " 37	Rabies.
" " 38	The Carrot Fly.
" " 39	Assessments to Land Tax.
" " 40	The Kestrel or Windhover.
" " 41	The Red Spider or Spinning Mite.
" " 42	The Short-eared Owl.
" " 43	Titmice.
" " 44	The Common Lapwing or Plover.
" " 45	The Starling.
" " 46	The Stem Eelworm.
" " 47	The Asparagus Beetle.
" " 48	The Pea Thrips.
" " 49	The Fruit Tree Beetle.

Copies of the above leaflets can be obtained free of charge and post free on application to the Secretary, Board of Agriculture, 4, Whitehall Place, London, S.W. Letters of application so addressed need not be stamped.

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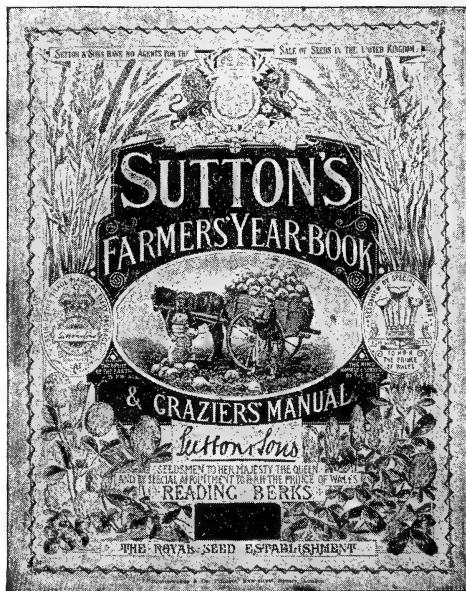
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TO H.R.H.
THE PRINCE OF WALES.

The Journal

OF THE

BOARD OF AGRICULTURE

DECEMBER, 1898.

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OF THE

BOARD OF AGRICULTURE.

Vol. V. No. 3. DECEMBER, 1898.

THE GRAIN HARVEST OF 1898.

The Board of Agriculture issued on the 6th inst. the annual preliminary statement showing the estimated total yield of the wheat, barley, and oat crops of Great Britain for the current year. The returns published in August last indicated that the wheat crop of 1898 was grown on a surface greater by 213,000 acres than the wheat area of 1897, and as the official estimates of the yield now available show the results of the harvest to have been $5\frac{1}{2}$ bushels per acre over the average of the ten years 1888-97 the total out-turn is very considerably in excess of that of the previous year. Stated in bushels, the wheat harvests of the past two years are contrasted in the following table, in which the last column also shows the average of the decennial period 1888-97:—

WHEAT.	Estimated Total Produce.		Estimated Yield per Acre.		Average of the Ten Years 1888-97.
	1898.	1897.	1898.	1897.	
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
England - - - -	69,074,387	51,724,955	34'76	28'97	29'19
Wales- - - - -	1,582,086	1,332,192	26'83	24'76	23'49
Scotland - - - -	2,372,383	1,883,388	42'47	37'83	35'80
Great Britain- -	73,028,856	54,940,535	34'74	29'08	29'19

The yield per acre of 34·74 bushels is the greatest that has appeared in the annual estimates which have been collected since the year 1884, and it may be added that the increases in England, Wales, and Scotland over the previous year's wheat crop, and over the decennial average, of which last year's crop fell but slightly short, are everywhere considerable. No county in England and Wales fails to report an increased yield, and only three in Scotland, where the area under wheat was very small, differ from the general tenor of the returns.

The county figures of the yield of the wheat crop of 1898 will in due course appear in the completed Agricultural Returns; but it may be stated here, in advance of these, that an examination of the results in the groups of contiguous counties treated as possessing certain common agricultural features, which have been frequently quoted in connection with Produce Statistics, has shown that once again the highest average estimated yield for any one of the eight sub-divisions of England is recorded, as it was in 1897, in the group formed by the counties of Norfolk, Lincoln, and the East Riding of York, where no less than 37·24 bushels per acre are estimated to have been obtained. The lowest yield of wheat, which, however, reached 30·80 bushels as compared with 26·26 bushels in 1897, was, it may be also noted, again returned from the extreme southwestern group of counties made up of Somerset, Dorset, Devon, and Cornwall.

The yield of the barley crop of 1897 was estimated as having been exactly equivalent to the average of the ten years 1887-96, or 32·82 bushels per acre. In the present season the yield is 35·75 bushels, or 2·78 bushels above the average of 1888-97, the Welsh and the Scotch crops showing proportionally a larger excess than the English over the decennial estimates. The acreage under barley in Great Britain this season was 132,000 acres less than in 1897, but the total production was, as the consequence of the satisfactory yield, nearly 155,000 quarters greater, as the subjoined table shows.

The largest average yield of barley in any of the groups of English counties referred to above was, as was also the case

last year, reported from Yorkshire (West and North Ridings), Durham, and Northumberland, where a mean of 37·46 bushels was estimated; while the relatively smallest yield was returned from the west-midland group of Salop, Worcester,

BARLEY.	Estimated Total Produce.		Estimated Yield per Acre.		Average of the Ten Years 1888-97.
	1898.	1897.	1898.	1897.	
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
England - - -	55,377,522	55,158,713	35·44	32·48	32·93
Wales- - - -	3,377,413	3,116,438	32·82	29·86	29·22
Scotland - - -	9,296,983	8,538,915	39·07	36·63	35·77
Great Britain- -	68,051,918	66,814,066	35·75	32·82	32·97

Gloucester, Wilts, Hereford, and Monmouth, for which the average was 33·97 bushels.

The average yield of oats in Great Britain in 1898 is reported as reaching 40·76 bushels per acre. This is 2·25 bushels over a ten years' average. As will be seen from the table below, however, the oat crop of England was nearly 3 bushels, and that of Wales nearly 4 bushels, over average, the Scotch results being less uniformly good, and standing less than half a bushel per acre over the decennial average.

OATS.	Estimated Total Produce.		Estimated Yield per Acre.		Average of the Ten Years 1888-97.
	1898.	1897.	1898.	1897.	
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
England - - -	75,282,761	73,638,993	43·49	40·26	40·50
Wales- - - -	8,389,938	7,765,962	36·37	32·56	32·42
Scotland - - -	35,248,218	35,442,224	36·87	36·60	36·50
Great Britain- -	118,920,917	116,847,179	40·76	38·49	38·51

THE THINNING OF WOODS.

It is only comparatively recently that anything like serious consideration has been given in this country to the growing of timber under economic conditions. Before the days of steamships built of iron and steel the most valuable forests throughout Britain were those, particularly in the South of England, whence were drawn the supplies of Oak for the requirements of the naval dockyards and of the various other centres of shipbuilding activity. The principles which guided planters and landowners in those days were wide planting and large growing-space for each individual tree, so as to permit ramification and the freedom of growth necessary for the production of crooks and curved timber having special value as knee-pieces and ribs in ship-building.

The isolated position of trees in hedgerows and in parks attained such an object in the fullest possible degree, while in plantations and other woodlands the nearest approach to similar conditions lay in giving each tree a larger amount of growing space than was essential for the maintenance of healthy and energetic growth. At the same time, this method of treatment of timber trees had a much finer æsthetic effect, and gave certain facilities for the rearing of game birds. In this manner it therefore appealed in a special degree to the sporting instincts of British landowners. The forestry which consequently evolved itself and became established in Britain was "Arboriculture," or the cultivation of the individual tree. The root-system was allowed to expand somewhat freely, while the crown of foliage and the branches spread proportionately. To begin with, planting was only carried out at comparatively wide distances; while thinning operations under such circumstances were undertaken with a much freer hand than would

otherwise have been desirable. So far as there can be said to have been any rule about the matter of thinning, it was considered that the proper distance to be maintained between trees varied from about one-third of their height in the case of Larch, Firs, and Pines, to about the full height of the tree for broad-leaved kinds like Oak, Elm, or Ash.

Views of the above nature are now beginning to give place to others more in accordance with economic forestry, or "Sylviculture," as practised on the Continent. Many land owners have realised, or are now realising, that material advantage—apart from æsthetic considerations—lies less in arboricultural treatment of the individual tree than in management of the entire crop of timber in such a manner that it may bring in the maximum monetary return per acre and per annum without exhausting the soil or causing its capital value, as measured by its productivity, to become deteriorated.

Now that large areas have been thrown out of arable cultivation and transformed into pasture, the poorer qualities of the grass lands are sometimes so unprofitable as to leave no other alternative than either utilising them for the growth of timber or allowing them to revert into rough hill pastures. Where new plantations are being formed on land of this sort, good returns can only be obtained if the economic aspects of timber production are duly considered; and even with regard to many existing woods, much improvement could be effected by the study and the application of the simple principles upon which the Continental system of thinning woods is based. The principles themselves are simple enough, though their correct application is often difficult in practice.

The class of timber which it is now most remunerative to cultivate as woodland crops is long straight stems, free from branch-knots and "full-wooded" in the bole—that is to say, with the diameter of the top-end as large as is practicable in proportion to that of the butt-end. To attain this object as fully as may be possible, and to produce the best monetary returns from the capital represented by the soil and the growing stock of timber, it is essential that the trees selected for cultivation be suitable for the given soil and situation,

that they be placed in the soil at such distances from plant to plant as experience and the natural requirements of the given kinds of trees prove to be most advantageous, and that the timber crops receive proper tending throughout their whole period of development. In addition to these points, much—in some cases, everything—of course depends on the market rates locally obtained for different kinds of timber ; but, so far as the art of forestry is concerned, the above are the chief factors upon which the ultimate value of the mature timber crop depends.

If the trees have been planted too far apart, then they may have ramified to such an extent as to have their boles spoiled before the crop forms canopy ; and tending operations thereafter, in the shape of thinnings, often fail to correct the initial errors made. It may easily happen that woods too open at 20 or 25 years of age may be overcrowded at twice or thrice that age ; and yet the stems may not be clean, smooth and tall, as they should be if the plantations had been originally formed with a suitable distance from plant to plant. If, however, woods have been properly formed and tended during the early stages of growth, then, *cæteris paribus*, their ultimate value as timber crops is principally affected by the manner in which thinning operations are carried out.

In sylvicultural operations two main factors, or assets, have invariably to be dealt with in each concrete case. These are first, the soil, and secondly, the timber crop or growing stock. These form the capital entrusted to the charge of the forester ; and his technical skill is shown in the manner in which—unless interfered with by circumstances beyond his control—he utilises them to most advantage. Even the destructive influence of physical causes beyond his control,—as, for example, wind, snow-breakage, &c.,—can to a certain extent be obviated by good management in the case of extensive compact woodlands. The two factors, soil and crop, are both invariably involved in the closest degree in the consideration of any points connected with the growth of timber. Unless the productive capacity of the soil be safeguarded in a practical and judicious manner, the energy in growth displayed by the

crop does not attain its maximum; and, on the other hand, if the crop be not tended in a proper manner the productivity of the soil is prejudiced, and consequently the capital value of the land sinks. There is only one way of ensuring the requisite conservation of the productive capacity of the soil against the deteriorating effects of sun and wind, and this consists in the maintenance of a complete and effective leaf-canopy. Woods consisting of light-demanding kinds of trees, like Oak, Ash, Larch, or Scots Pine, whose normal density of canopy is of itself insufficient to ensure conservation of the soil, can therefore only be grown economically along with shade-bearing densely foliated trees like Beech or Spruce, or by being underplanted with such soil-protecting genera. To discuss this matter would, however, lead too far from the question of thinnings, with which the present article is more particularly concerned.

To utilise in the most thorough and advantageous manner the productive capacity of the soil, it is essential that the stock should be maintained in close canopy from the thicket stage of growth onwards, until it has passed through the more energetic period of its growth in height. It is only by such means that the formation of a clean straight bole can be attained. If more than the requisite individual growing-space be afforded, then there is an immediate tendency to dissipate the vegetative energy in ramification and in the production of twigs, in place of having the crowns of foliage drawn up so as to obtain the maximum length of stem possible under the existing conditions of soil and situation. To allow plantations to become overcrowded, by leaving the individual stems to struggle on till they are dominated and finally suppressed and killed by their stronger neighbours in the struggle for existence, is uneconomical in a degree. In the first place, the dominated stems gradually languish, and then fall into a sickly condition predisposing them to attacks from noxious insects and parasitic fungi, which may spread and finally overrun the whole plantation. Secondly, when the stems are becoming suppressed it is better to cut and utilise them rather than to allow them to decay and lose any marketable value they may have. And thirdly, if left *in situ* longer than is necessary for the maintenance of the leaf-canopy, they inter-

fare with the more rapid development of the dominant stems from among which the future mature crop must be formed by means of the survival of the fittest. The prolongation of the struggle for existence in the case of the weaker stems directly prejudices the development of the stems of stronger growth, by leading to a dissipation of vegetative energy which can, under the guiding hand of the forester, be utilised for the more vigorous increment of the stems of forward growth. To regulate the number of stems in any wood still in vigorous growth, or capable of being thereby stimulated into enhanced energy, is therefore the object of thinning.

The natural tendency of forests to thin themselves depends on the kind of tree and the quality of the soil. Light-demanding trees, like Oak, Ash, Scots Pine, or Larch, thin themselves sooner and to a greater extent than Alder, Maple, Sycamore, or Austrian Pine; and these again thin themselves before the suppression of weakly stems takes place among shade-bearing kinds like Beech, Spruce, or Silver-Fir. Again the processes of domination, suppression, and final elimination of unnecessary stems takes place more rapidly on poor than on good soils. Observations made in the Harz Mountains in Central Germany with regard to Spruce growing in woods naturally regenerated, or raised from thick sowings, showed the following to be the average number of stems and the individual growing-space per stem at different ages:—

Age in Years.	Stems per Acre.	Average Growing-space in Square Feet.
20	9,265	4'6
40	1,249	34'5
60	604	70'0
80	388	111'0
100	282	152'0
120	238	182'0

These statistics show that on the Continent such timber crops are much denser than British landowners have been in the habit of growing them. The out-turn in Spruce woods of normal density at any given age varies, according to the quality of the soil, from a total of about 5,000 to 11,000, and even 12,000, cubic feet of clean, well-grown timber per acre.

It seems strange that the advantages of growing timber so as to produce fine long boles free from knots were not sooner realised, and it is only reasonable to suppose that æsthetic and sporting considerations were of far greater importance in the eyes of British landowners. The value of such timber, and incidentally also the accidental means by which it had been produced, are thus quaintly described in the following extract from Gilbert White's "Natural History of Selborne" (Letter II.) :—

"On the Blackmoor estate there is a small wood called Losel's, of a few acres, that was lately furnished with a set of oaks of a peculiar growth and great value; they were tall and taper like firs, but, standing near together, had very small heads, only a little brush, without any large limbs. About twenty years ago the bridge at the Toy, near Hampton Court, being much decayed, some trees were wanted for the repairs that were fifty feet long without bough, and would measure twelve inches diameter at the little end. Twenty such trees did a purveyor find in this little wood, with this advantage that many of them answered the description at sixty feet. These trees were sold for £20 apiece."

The requisite density of crop having for some time been assured, the object of thinnings is to stimulate the further development of the crop without any such interruptions of the canopy as may prejudice either the continuation of growth in height of the young trees or the productive capacity of the soil; while the extent to which thinning should be carried out depends on various factors. The crops most in need of thinning are those in which the individual plants are all of about the same age *e.g.*, in plantations, as the struggle for individual existence is then keener than when some plants gain an advantage in height over others from the very start. The age of the crop is also a factor of importance; for the need of thinning is greatest during the pole-forest stage of growth, when assistance given to nature in the work of elimination of the dominated and suppressed stems is of immense advantage to the dominating and predominant poles. The kind of tree must also be considered, as light-demanding genera require

earlier and more frequent assistance than shade-bearing trees.

Finally, soil and situation must also be taken into account; for on inferior soil, and on an exposed or otherwise unfavourable situation, there exists a greater necessity for shortening the natural struggle than on favourable soils and situations, where the conflict between the stronger and the less vigorous stems is shorter, sharper, and more decisive.

In thinning operations the dead and dying stems should invariably be removed, as they are apt to form breeding grounds for noxious insects and *nidi* for the propagation of fungous diseases. If confined to these, however, the operation can only be considered a *slight thinning*. A *moderate thinning* removes also the suppressed class of stems, while a *heavy thinning* eliminates the dominated stems in addition thereto. Even in a heavy thinning the extent to which the dominated stems should be removed depends in each case on the concrete factors above referred to, the limitations of the thinning being dependent on the energy of the growth in height and on considerations regarding conservation of the soil. From the age of 15-25 years onwards, pole-forests of Oak, Ash, Larch, and Scots Pine should be thinned, if practicable, about once every five years; while similar woods of Spruce, Silver Fir, Beech, and Maple ought not to require the operation till between the twentieth to thirtieth year, and after that not more than once every eight or ten years.* The best rule for thinnings is to begin them early, to conduct them moderately, and to repeat them frequently, bearing in mind that on inferior classes of soil the conservation of its productive capacity demands that the thinnings should be slighter, but more frequently repeated, than on good soil.

* In Continental forestry the term *thinning* is applied only to operations in which the value of the stems cut out cover, or more than cover, the cost of the operation. Previous to that, the operations conducted on the same principles for the benefit of the growing crop are called *weedings* and *cleanings*, "weedings" referring to the removal of other kinds than the main crop, and "cleanings" to the elimination of weaklings or superfluous portions of the latter. This is a purely arbitrary technical definition, which indicates that charges for weeding and cleaning are debitable to the growing crop while thinnings either cost nothing or else form a source of revenue, with which the land and the crop must be credited.

Judiciously carried out, and with a favourable market, thinnings are often very remunerative in themselves, besides having an important effect in enhancing the rate of increment in the remaining trees and the future technical and monetary value of these latter. The larger growing-space thus afforded to the crowns usually results in the formation of much broader annual rings till the crop forms close canopy again. When the growth in height has been practically completed, the thinnings can be made heavier, so as to enable better crowns of foliage to be formed with a view to improving the shape of the bole and to increase it in top-diameter relative to the diameter near the base of the tree. This latter operation, indeed, now forms a special feature of Continental forestry in the treatment of light-demanding trees like Oak and Larch. The thinning is carried out to the extent of a *partial clearance* (over 15 per cent. of the basal area of the stems forming the crop being removed), and is combined with natural regeneration in the case of shade-bearing trees, or else with the under-planting of light-demanding trees like Oak, Larch, and Pine. After such a partial clearance the trees are allowed to stand for a considerable number of years in an almost isolated position with a view to the stimulation of their rate of increment before being felled and brought to market. This measure is, however, only advisable on good soils where underwood below such standards can be provided without much outlay for the protection of the soil against sun and wind.

J. NISBET.

THE INFLUENCE OF MANURES ON THE PRODUCTION OF MUTTON.

The present article may be regarded as a preliminary report on the experiments to determine the influence of manures on the production of mutton through the agency of pasture carried out at the Northumberland County Demonstration Farm, of Cockle Park, which is under the direction of the Agricultural Department of the Durham College of Science.

In coming to a decision with regard to the class of farm that should be rented for agricultural demonstrations and experiments, the Technical Education Committee of the Northumberland County Council were considerably influenced by the desire to obtain a place that should contain a considerable area of grass land typical of a wide extent of poor pasture in the county. They believed that such land had in many cases been systematically neglected, and that, if it could be shown how a profitable improvement was possible, a considerable benefit would be conferred upon those interested in a similar class of land. The type of grass land in question grows a somewhat rank, coarse herbage, consisting largely of *Agrostis*, which is not at all relished by stock, and whether as pasture or as hay it is manifestly deficient in nutritive properties. The annual value of such land is seldom over 10s. per acre, though when wheat was selling at about 50s. per quarter much of it commanded a rent of 30s. and upwards per acre. It is, in fact, strong clay land, very similar to much that is met with in many parts of England, and which now constitutes a class of pasture of low feeding properties, and, in many cases, of doubtful "soundness." The strong growth of the herbage which it bears is proof, however, that such land is not poor through absolute dearth of plant food, but only because the plants that it carries are deficient in digestible nutritive materials. In fact it is conceivable that such land might be largely increased in value if it could be induced to bear a better type of herbage, without necessarily producing a larger weight of material,

though improvement both in quantity and quality would manifestly be the most desirable result of all.

After inspecting several farms the Committee resolved to lease Cockle Park, containing rather over 400 acres, at a rent of £200 per annum, upwards of 100 acres of which was valued at 5s. per acre. In the winter of 1896-97, the Tree Field, consisting of about 34 acres of the class of pasture referred to, was sub-divided by stock-proof fences into ten plots of three acres each, the balance being held in reserve to provide an extra plot, if required. Besides these ten large plots, other ten sub-plots, of $\frac{1}{20}$ acre each, were also fenced off, each of the larger plots embracing one of the minor plots. The whole field was very equal in character, so much so that it would have been difficult to say that one plot was better than another. Each of the main plots was provided with a supply of drinking water, and all were in much the same condition as regards shelter, Nos. 8, 9, and 10 having the advantage, if any, in this respect.

Early in 1897 the manures indicated in the accompanying tables were applied, due regard being paid to such matters as allowing an interval to elapse between the application of the super. and lime to plot 8, and the withholding of the sulphate of ammonia of plot 9 till growth had fairly started. The manures were all analysed, and the quantities were so arranged that 200 lbs. per acre of phosphoric acid were applied to No. 3; 100 lbs. per acre of the same substance to Nos. 4, 5, 7, 8, 9, 10; 50 lbs. per acre of potash to No. 7; 20 lbs. of nitrogen to No. 9; and 17.2 lbs. of nitrogen to No. 10. No. 1 received no direct manuring so far as the pasture plot was concerned, but the sheep grazing it received $\frac{3}{4}$ lb. per head per day of decorticated cotton cake—two consignments showing 6.98 per cent. and 6.84 per cent. of nitrogen; while sub-plot No. 1 received ground decorticated cotton cake (7.31 per cent. nitrogen) equal to about 6 cwt. per acre, and containing 50 lbs. of nitrogen. At the end of three years the pastured area of plot 1 will have received about the same amount of nitrogen in the form of manurial residue as the sub-plot (hayed) received in its first year in the shape of crushed cake. Except in the case of the pasture portion of Plot 1, where the sheep have each year consumed $\frac{3}{4}$ lb. per head

TABLE I.

INFLUENCE OF MANURES ON THE PRODUCTION OF HAY IN THE TREE FIELD AT COCKLE PARK. RESULTS FOR 1897 AND 1898.

(All calculations are made in terms of an acre.)

Plots.	Manures applied in 1897, Nothing applied in 1898.	Cost of Treatment.	The Hay Crop of 1897.				The Hay Crop of 1898.				Result in Two Years.				Increased Yield in Two Years.	Value of Increase at 50s. per ton.	Net Gain (+), or Loss (-) in two years.
			Weight.		Botanical Analysis, Per cent.		Weight.		Botanical Analysis, Per cent.		Result in Two Years.						
Cwt.	Gramineae.	Leguminosae.	(White Clover).	Miscellaneous.	Cwt.	Gramineae.	Leguminosae.	(White Clover).	Miscellaneous.	Cwt.	Gramineae.	Leguminosae.	(White Clover).	Miscellaneous.			
1	6 Cwt. Dec. Cot. Cake	s. d. 36 7	84	2	(0.2)	14	181	91	87.5	1.5	(0.1)	11.0	81	s. d. - 15 4			
2	4 Tons Common Lime	52 0	74	5	(0.2)	21	161	84	79.0	5.0	(0.1)	16.0	11	- 48 10			
3	4 Ton Basic Slag	22 0	66	13	(4.8)	21	321	74	70.0	16.5	(9.3)	13.5	19	+ 25 6			
4	4 " "	11 0	58	9	(2.4)	33	321	64	61.0	19.0	(9.0)	20.0	4	+ 19 8			
5	7 Cwt. Super	18 2	73	9	(1.1)	18	221	81	77.0	10.0	(0.6)	13.0	10	+ 7 6			
6	Nothing	—	78	4	(0.1)	18	135	86	82.0	5.5	(0.2)	12.5	—	—			
7	7 Cwt. Super— $\frac{1}{2}$ Cwt. Sul. Pot.	25 10	76	9	(0.6)	15	17	82	79.0	9.0	(2.4)	12.0	* 1	- 29 0			
8	7 Cwt. Super— $\frac{2}{3}$ Ton Ground Lime	28 2	57	12	(0.8)	15	201	72	64.5	24.0	(2.7)	11.5	9	- 3 9			
9	7 Cwt. Super—97lbs. Sul. Am.	26 11	72	12	(0.2)	16	211	73	72.5	15.0	(1.2)	12.5	13	+ 6 3			
10	6 Cwt. Dissolved Bones	30 7	81	11	(2.5)	8	231	75	78.0	13.0	(6.0)	9.0	14	+ 4 5			

* Decrease.

per day of cake, none of the plots, main or minor, has received any dressing since the spring of 1897.

On June 21st, 1897, each plot was stocked with eight cross hoggets, which grazed the pasture till October 11th, the season thus embracing sixteen weeks.

In 1898 some of the manures had produced such a marked change that it would manifestly have been opposed to practical farming to have stocked all the plots alike. One result of applying an effective manurial substance to pasture is that the stock subsequently thrive better upon it, while another result is that the land provides grazing for a greater number of animals. After inspection, the Committee resolved that on May 16th, 1898, six sheep should be placed on plot 6; eight on plots 2, 4, 5, 7, 8, 9, 10; and ten on plots 1 and 3. Six weeks later it was evident that plots 1 and 7 would carry an extra sheep, and that the stocking of plots 3, 9, and 10 might be increased by the addition of two sheep, and these changes were accordingly made on June 27th. No further alterations were considered necessary during the grazing season, which extended to twenty weeks, terminating on October 3rd. Only one sheep died during the two years, but in each season another had to be removed on account of sturdy. In each case a reserve sheep was at once substituted, and due allowance made.

Each year sheep (crosses, by a Border Leicester ram out of a Highland ewe) were purchased expressly for this experiment, and great care was exercised in selecting the particular animals that were destined for the plots. All sheep manifestly above or below the average in point of size or condition were rejected, and in the second season the various lots on the several plots were of so even a character, that there was less than a pound of variation in the average weight of the animals. The sheep cost, shorn, 29s. each in 1897, and 25s. in 1898.

Each sheep was weighed separately at the end of every month, the difference between the original and final weights giving the total gain in live weight as shown in Table II. For purposes of comparison it is convenient to present all figures in terms of an acre. Thus, the gross weight of the eight sheep on plot 4 was 755 lbs. at the beginning of the season of 1897, and 886 lbs. at the termination of the period of grazing.

TABLE II.

INFLUENCE OF MANURES ON THE PRODUCTION OF MUTTON IN THE TREE FIELD AT COCKLE PARK.
RESULTS FOR 1897 AND 1898.

Plots.	Treatment per Acre (for 1897 only), except on Plot 1, where the Sheep got Cake both in 1897 and 1898.	Total cost of Treatment per Acre.	Live-weight In- crease per Acre in lbs.		Live Weight Increase per Acre in two years in excess of Plot 6.	Butcher's Valuation per Sheep at end of Season.		Butcher's Valuation in excess of Plot 6 in two years.*	Net Gain (+) or Loss (-) per acre in two years as determined by :—		Live Weight Gain in lbs. per Sheep per week.		Plots.				
			1897	1898		Total	Weight in lbs.		Value at 4d. per lb.	s. d.	s. d.	s. d.		(a) Weight.	(b) Butcher.	1897	1898
1	{ 5½ Cwt. Dec. Cot. Cake eaten by } sheep	s. d. 32 6	80	144	224	134	44 8	s. d. 36 0	s. d. 31 0	s. d. + 12 2	s. d. + 9 9	1'9	2'0	1			
2	4 Tons Common Lime	52 0	32	64	96	6	2 0	32 0	24 0	- 50 0	- 44 8	0'7	1'2	2			
3	½ Ton Basic Slag	22 0	77	171	248	158	52 8	33 0	34 0	+ 30 8	+ 25 10	1'8	2'2	3			
4	½ Ton "	11 0	44	113	157	67	22 4	33 0	35 0	+ 11 4	+ 15 0	1'0	2'1	4			
5	7 Cwt. Super."	18 2	56	104	160	70	23 4	32 0	36 6	+ 5 2	+ 6 6	0'9	1'3	5			
6	Nothing	—	37	53	90	—	—	26 0	28 0	—	—	1'3	1'6	6			
7	{ 7 Cwt. Super. + 1½ Cwt. Sul- } phate of Potash	25 10	72	121	193	103	34 4	32 0	33 0	+ 8 6	+ 7 9	1'7	2'1	7			
8	{ 7 Cwt. Super. + ½ Ton Ground } Lime	28 2	69	119	188	98	32 8	33 0	32 0	+ 4 6	+ 3 2	1'6	2'2	8			
9	{ 7 Cwt. Super. + 97 lbs. Sulp. } Ammon.	26 11	79	94	173	83	27 8	33 0	30 0	+ 0 9	+ 1 7	1'8	1'5	9			
10	6 Cwt. Dissolved Bones	30 7	59	117	176	86	28 8	34 0	32 0	- 1 11	+ 5 11	1'4	1'9	10			

* Arrived at thus—taking, as an example, Plot 7:—In 1897 the sheep cost 29s. each, and as those on Plot 6 were valued at only 26s. at the end of the season, the grazing of the eight sheep represents a loss of 24s. Those on Plot 7, on the other hand, gained 3s. per head, or 24s. per plot. In the first year, therefore, the value of the produce of Plot 7 is 48s., i.e., 16s. per acre, in excess of that of Plot 6. In 1898, the sheep cost 25s. per head. The six on Plot 6 have thus given a return of 18s.; the eight on Plot 7 have increased 5s. 6d. per head, or 44s. per plot. Deducting 18s. from 44s. we get 26s., and this, divided by three, gives 8s. 8d. per acre. On the two years the butchers' valuation of Plot 7 is thus 16s. + 8s. 8d. = 26s. 8d. per acre in excess of Plot 6. Where, in the second year, sheep were added to certain plots, at the end of the sixth week their original value was put at 26s. 3d., to allow for six weeks' keep.

This shows a live-weight gain of 131 lbs. per plot, or 44 lbs. per acre. In 1898 the original weight of the eight sheep on this plot was 533 lbs., and the final weight 872 lbs., the gain being thus 339 lbs. per plot, or 113 lbs. per acre. In 1897 the sheep were clipped before grazing commenced, while in 1898 shearing took place a month after the plots were stocked, the weight of wool being deducted from the initial gross weight. The figures just quoted indicate that the animals thrived better in 1898 than in 1897, and Table II. shows that this was the case with all the lots except No. 9. This general result is to be accounted for partly by the season, but chiefly by the class of animals, those of the second season being evidently better adapted for the locality than the stock of the previous year.

The somewhat restricted area of grazing ground—namely, three acres—at the disposal of each lot of sheep did not appear to interfere in any way with the health of the animals, the live-weight gain per head per week, as shown by the last two columns of Table II., being in several cases much higher than is usually shown by sheep on pasture.

The much greater rate of progress in the early weeks, as compared with the later weeks, of each season was very conspicuous. Taking the average for the whole of the sheep on the ten plots the gain per head per week works out as follows:—

Period				In 1897.	In 1898.
				lbs.	lbs.
During the 1st Month	-	-	-	2'26	3'43
" " 2nd "	-	-	-	2'01	3'41
" " 3rd "	-	-	-	1'10	1'77
" " 4th "	-	-	-	0'32	1'25
" " 5th "	-	-	-	—	loss 0 24

At the end of each season's grazing a butcher-salesman of Newcastle visited the farm, handled all the sheep, and put the valuations upon them as shown in Table II. At the end of the second season two sheep from each plot were slaughtered and reported on from the butcher's point of view. In no case was he made acquainted with the treatment the sheep had received. While these valuations and reports are most useful as a check to the valuations deduced from the live-weight increases, it is probable that the latter are

essentially the more reliable, it being impossible for anyone by mere inspection and handling to make the fine distinctions that are revealed by the balance. Table II. shows, however, that the two methods of valuation are closely consistent; in fact only in the case of the sheep of plot 10 are the two sets of figures seriously divergent.

The cost of the cake and manures is arrived at by taking the actual price at the nearest railway station, and adding 2s. per ton for cartage.

The botanical analysis of the hay was made on samples taken on a definite system.* All the plant-species met with were separated and weighed, but in Table I. the percentages of grasses, *Leguminosæ*, and miscellaneous herbage only are stated, an exception, however, being made in the case of white clover, a plant which possesses unusual interest where questions affecting pasture are being discussed. Besides white clover all the plots—notably No. 8—contained bird's foot trefoil, while meadow vetchling and red clover were also present—though seldom abundant—in a considerable number of cases.

Although the experiment is essentially concerned with the influence of the cake and manures on the rate of growth of the sheep with which the plots were stocked, it may be mentioned that at the end of each season certain of the plots still contained a considerable amount of available herbage. For various reasons it was desirable to get rid of this "roughness," and this was effected by placing a certain number of store heifers (Galloway and West Highland) on the plots concerned, and keeping them there for a definite period of time. The keep of these animals is an item that may fairly be placed to the credit of the manures, and this will ultimately be done, but for the present no account need be taken of the value of such supplementary grazing, though in the course of a few years it will be by no means inconsiderable.

Having thus referred to certain points affecting the general arrangement of the experiments, the following brief notes together with the butcher's report for 1898, are offered as an indication of the position of matters at the end of the second season.

* See "Sixth Report on Experiments with Crops and Stock." By W. Somerville, p. 104.

Effect of Decorticated Cotton Cake (Plot 1).—The 6 cwt. of ground cake applied to the hayland of Plot 1 has produced an increase of $8\frac{1}{2}$ cwt. of hay per acre, but at the rate of valuation adopted, namely 50s. per ton, this form of treatment has not yet produced a profit. The *Leguminosæ* are here at their absolute minimum.

The effects of the cake on the sheep are very satisfactory. In 1897 the live-weight gain recorded on Plot 1 was the highest of the series, though in 1898, when the influence of the manures was much more pronounced than in 1897, the aggregate gain in mutton was considerably greater on one of the other plots, while the increase per head per week was exceeded by the sheep on four of the plots. By both systems of valuation, however, the use of the cake has been directly profitable.

At the end of the season of 1898 the butcher reported, "Skin shows healthy thriving condition. The sheep have slaughtered quite equal to promise according to handling, that is, their mutton showed a good deal of what we call 'sap,' and is therefore fine-flavoured and tender."

Effect of Common Lime (Plot 2).—This substance has produced practically no effect on the hay, and has done nothing to stimulate the growth of clover or other *Leguminosæ*. In both years the rate of increase per head per week was lower on the limed plot than on the untreated ground. Whether tested by hay, by live-weight increase, or by the butcher's valuation, the use of this substance shows a loss of 44s. to 50s. per acre.

Regarding the sheep the butcher reported, "Not thriving, skin shows a want of 'bloom.' Mutton as dry as 'chips,' giving the impression that the sheep were not only not improving, but had the appearance of going back."

Effect of Adding Lime to Phosphate (Plot 8). Some interest centres round the question as to whether the free lime in basic slag contributes anything to the effectiveness of that manure. By way of throwing some light on the question, Plot 8 was treated precisely like No. 5—that is to say, both received 7 cwt. per acre of superphosphate; but Plot 8 got, as an additional dressing 10 cwt. per acre of finely-ground quicklime. The

lime has had no influence on the quantity of the hay, but it appears to have materially increased the percentage of *Leguminosæ*—not so much the white clover, however, as bird's foot trefoil. In both years the lime has had an appreciable effect on the production of mutton, being responsible for 13lb. live-weight increase in 1897, and 15lb. in 1898. Moreover, in both years, the butcher's valuation of the sheep on Plot 8 is somewhat in excess of the value put upon the sheep of Plot 5. By the two methods of valuation, however, the outlay on the lime has not yet been recovered, though the debit balance is but small.

The butcher reported, "Best finished sheep, but rather small in size, which brings the price down a little. The mutton comes out very well indeed, proving quite equal to promise."

It is thus evident that, although a large dressing of lime used alone (Plot 2) has, so far, proved useless if not injurious, a small quantity, employed in conjunction with a phosphate, has exercised a beneficial influence.

The Effect of Basic Slag (Plots 3 and 4).—The material employed contained 38·82 per cent of calcium phosphate, and showed a fineness of 79 per cent. It was applied on or about February 8, 1897. In the first season it had no effect on the quantity of hay produced, though it had a marked influence on the *Leguminosæ*; white clover, for instance, being twenty-four times as abundant on Plot 4 as on the untreated ground (Plot 6), while on Plot 3 it bulked twice as largely as on Plot 4. It is interesting to note that the percentage of white clover on the two "slagged" plots is in exact proportion to the amount of manure employed. In 1898 both dressings of slag more than doubled the yield of hay, though there is practically no difference in the weight of crop produced by the two quantities of manure. The percentage of *Leguminosæ* was at its maximum on these two plots, though actually more of this class of herbage, including white clover, was produced by the small than by the large dressing. With hay at 50s. per ton, both dressings have paid well, the larger giving a higher net profit than the smaller.

It is, however, when reference is made to Table II. and

the influence of the manures on the growth of the sheep is considered, that the effects of basic slag become most interesting. In the first season, when each plot was grazed by eight sheep, the rate of progress of the animals that grazed Plot 3 (1·8 lbs. per head per week) was very much greater than in the case of Plot 4 (1·0 lb. per head per week). In 1898 eight sheep grazed No. 4 for the whole season, whereas ten sheep were on No. 3 for six weeks, and twelve sheep for the other fourteen weeks. Although Plot 3 was so much more heavily stocked than Plot 4, the herbage remained much more abundant, and the weekly gain per head was also greater. In the two seasons Plot 3 has produced 91 lbs. more live-weight increase per acre than Plot 4, and this, at 4d. per lb., is worth 30s. 4d. In both years also, the butcher's valuation of the sheep on Plot 3 is distinctly higher than in the case of those on Plot 4, the difference amounting to 21s. 10d. per acre. As the difference in the outlay on the two manurial dressings was only 11s. per acre, the larger application has proved very much more profitable than the smaller. In both cases, however, the basic slag has paid well, the original outlay having been returned more than twice over.

The butcher's report states, "Plot 3.—Sheep show good bloom, and are in thriving condition. In my opinion these sheep are the best both in condition when alive and in quality when slaughtered. They cut up thick in the loins, and would give satisfaction to purchasers. Plot 4.—Bloom fair, room for improvement, vary in quality. I should not like to class them so high as either Lot 1 or Lot 3 for 'sap' or for eating properties."

The Effect of Superphosphate (Plot 5).—As already mentioned, the 7 cwt. per acre of this manure applied to Plot 5 contained the same amount of soluble phosphoric acid—100 lbs.—as the 5 cwt. per acre of basic slag which Plot 4 received. The cost, however, of the former manure was 7s. 2d. per acre higher. In the season of application the super. produced considerably more hay than the slag, whereas the opposite was the case in 1898. This result is in accordance with popular and scientific opinion, that slag is slower

in its action than super. During the two years the slag has produced 2 cwt. more hay than the super, and while both have left a profit, that from the slag, chiefly on account of its lower cost, is much above the other. In the first season the percentage of leguminous herbage is 9 per cent. in both cases, but in 1898 the slag has produced much more *Leguminosæ*, and especially so in the case of white clover.

As regards production of mutton the super. surpassed the slag in the first season, whereas the opposite was the case in the second season. On the two years' working the super. has the advantage of 3 lbs. per acre of live-weight increase.

As in the case of the hay and sheep weights, so also in the case of the butcher's valuation, this being in favour of the super. in 1897, and of the slag in 1898. If the 100 lbs. of phosphoric acid could have been purchased at the same rate in the two forms of slag and super. there would be practically no difference in the financial position of these two manures on the results of the two years, but on account of the higher price of the super. the net gain is distinctly in favour of the slag.

The butcher reported, "Plot 5.—Sheep not first-class, rather dry and 'chippy' in the skin, not so good bloom as those on Plot 4. The mutton proved of a class that is in request, having a fair proportion of lean to fat."

The Unmanured Plot (No. 6).—The *Leguminosæ*, and especially white clover, were very scarce here, though, on careful examination, tiny clover plants—frequently comprising only a single leaf—could be found at the rate of about one per square foot. These plants were very inconspicuous, so much so, indeed, that a casual observer would have passed them over altogether, and yet, when the proper nourishment was offered to them, they were able in a year to develop to such an extent as to form the most conspicuous, though not the heaviest, part of the herbage. Nearly 60 per cent. of the herbage consisted of *Agrostis*, and on the average of the two years' botanical analyses no other species amounted to 6 per cent. The commoner plants, within the narrow limits of that minimum, were sweet scented vernal, cocksfoot, Yorkshire fog, ribwort, birdsfoot-trefoil, *Carex glauca*, *Triodia*

decumbens, *Briza media*, and *Aira cæspitosa*. Bad, however, as the natural pasture is, it was still capable of adding considerable weight to the animals that grazed it, the average increase per head per week being 0.9 lbs. in 1897 and 1.3 lbs. in 1898. The butcher reported: "Condition of skin fair, proved rather disappointing, did not slaughter so well as I expected."

The Effect of Sulphate of Potash (Plot 7).—This plot was dressed exactly like No. 5, except that Plot 7 received 50 lbs. of potash per acre in the form of 1 cwt. of commercial sulphate of potash. Judged by its effects on the hay-crop, this addition to the phosphate has proved anything but an advantage, the yield being reduced by over half a ton per acre in the two years.

Its effects are, however, distinctly better where the land is pastured, and each year it has been accountable for considerable live-weight increase, which in the aggregate amounts to 33 lbs. per acre, valued at 11s. As this increase has been obtained at an outlay of 7s. 8d., the use of the potash on the pastured ground has been moderately profitable. A practically similar result is got by the butcher's valuation (see Table II.). In his report he says, "Sheep in a healthy thriving condition, and equal in appearance to those of Plot 3. Carcases proved fair, but not equal to those from Plot 5."

The Effect of Sulphate of Ammonia (Plot 9).—As this manure was, like the others, applied only in the spring of 1897, it is not likely that any of it remained in its unaltered condition till 1898. As, however, nothing was removed from the pasture of Plot 9 but the mutton produced, most of the 20 lbs. of nitrogen applied in 1897, in the 97 lbs. of sulphate of ammonia per acre, must have remained in the land in the form of plant substance, manurial residue, etc., except in so far as there may have been loss into the subsoil or air. In point of fact the sulphate of ammonia had a marked effect on the pasture in 1898, so that in spite of the comparatively heavy stocking (10 sheep per acre for most of the season), it remained rougher than that on any other plot, with the single exception of No. 3.

In 1897 the hay yield of Plot 9 was the largest of the series

being $5\frac{1}{2}$ cwt. per acre in excess of that of Plot 5, where the ammonia was withheld. In 1898, on the other hand, the effects of the ammonia had entirely disappeared from the minor plot, but on the two years this substance has 3 cwt. per acre of hay to its credit, which, however, is not sufficient to meet the original outlay. So far, the nitrogenous manure has had no depressing effect on the percentage of *Leguminosæ* in the herbage, a state of things doubtless accounted for by the conjoint use of phosphoric acid.

In the first season the ammonia raised the live weight increase from 56 to 79 lbs. per acre, whereas in 1898 it caused a loss of 10 lbs., and exhibits a very poor gain per head per week. By the butcher's valuation, as well as by ours, the sulphate of ammonia has not proved profitable. The butcher's report states; "Sheep not so well finished as those of Plot 8, but in good slaughtering condition. Did not 'die' well; perhaps I expected too much."

The Effect of Dissolved Bones (Plot 10).—This manure supplied the same amount of phosphoric acid as the last, but slightly less nitrogen. So far as weight of hay is concerned, the dissolved bones have produced practically the same result as the mixture of super. and ammonia, but its effects on the *Leguminosæ* have been distinctly superior. On the average of the two years the percentage of white clover on Plot 10 was third highest.

As regards the effect of dissolved bones on the sheep it will be seen that this is disappointing in the first year, but fairly satisfactory in the second. A higher butcher's valuation in 1897 than the weight of the sheep would appear altogether to warrant has largely contributed to bring out a net credit balance of 5s. 11d. per acre, whereas valuation by weight has placed dissolved bones in the position of showing a loss, though not a large one.

The butcher reported, "Sheep in fair killing condition; skins healthy; 'died' as well as I expected from their appearance."

In the following Table two matters have been brought together that are worthy of a passing notice. In the second section of the table the average fasted live weight of the pair of sheep removed for slaughtering from each plot

is given, together with the weight of carcase and percentage of mutton. To those accustomed to deal with show

Plots.	Treatment.	Relationship of Hay to Mutton.			Relationship of Carcase to Live Weight.		
		Per cent. in excess of Plot 6.		Lbs. of Hay to 1 lb. of Live-weight increase.	Average Live Weight.	Average Dead Weight.	Per cent. of Mutton.
		Hay.	M'tton				
1	Cake - - -	24	149	22'1	103	54	52
2	Lime - - -	3	7	43'3	81	37	46
3	Full dressing of Slag	53	175	24'6	108	56	52
4	½ dressing of Slag -	34	74	34'3	101	47	47
5	Super - - -	29	77	32'1	101	52	51
6	Nothing - - -	—	—	44'3	98	50	51
7	Super + Potash -	3*	114	20'0	104	54	52
8	„ + Lime -	27	109	27'0	112	56	50
9	„ + Ammonia -	37	92	31'7	98	50	51
10	Diss. Bones - -	39	95	31'7	107	54	50

* Decrease.

sheep, or even with highly-fed commercial animals, the percentage of dead to live weight may appear small, though it is approximately what sheep of this class may be expected to yield. It will be noted that the sheep from the Plot getting lime alone slaughtered worst, while those from Plot 4 were, in this respect, only slightly superior. As regards the others the differences are but slight.

A matter of greater interest is dealt with in the first division of the table, which exhibits the percentage by which—in the two years—the cake and manures were able to influence the production of hay and live-weight increase (mutton). Taking, as an example, Plot 3, reference to Tables I. and II. will show that the yield of hay is raised from 35½ cwt. to 54 cwt. per acre, a gain, namely, of 53 per cent. By the same system of treatment the yield of live-weight increase is raised from 90 lbs. to 248 lbs. per acre, which represents a gain of 175 per cent. Now, if the production of mutton stood in simple relationship to the production of hay, we should, of course, find the percentages the same, but as the former is much in excess of the latter it follows

that the manures have had a markedly greater influence on the quality than on the quantity of the herbage.

Another cause that may be operating to produce the results indicated, is that when land is grazed it may bear a larger amount of food for stock than when its herbage is allowed to grow to maturity. Certainly the vegetable matter that is produced under the system of grazing must be much more digestible than is the case where grass and other plants are allowed to grow unchecked. Whatever the explanation may be, it is a matter not unworthy of further attention. It is probably hardly necessary to mention that there is a special reason for the percentage of mutton being in excess of that of the hay on Plot 1, where the oil and carbo-hydrates of the cake would have a material effect on the sheep, though none on the hay. No particular notice, therefore, need be taken of Plot 1 in regard to this question, but the consistent agreement that exists between the other plots strongly indicates that some general cause is affecting them all. The third column, which shows the number of pounds of herbage, stated as hay, necessary to produce 1 lb. of live-weight increase, clearly proves that a definite weight of improved herbage may produce as much increase in live-weight as a double quantity of poor herbage in its natural state. Thus, while it has taken the equivalent of over 40 lbs. of hay to increase by 1 lb. the weight of the sheep on Plots 2 and 6, it has required less than 25 lbs of material, similarly calculated, to effect the same increase in the case of the sheep grazing Plots 3 and 7. The conclusion would therefore appear to be justified that in judging of the success of any process practised for the improvement of grass-land, mere quantity of produce may prove a somewhat unreliable index.

W. SOMERVILLE.

THE CHAFFINCH (*Fringilla caelebs*)*

This is a well-known bird in all parts of Great Britain and Ireland, and a favourite with all except, perhaps, a few gardeners and fruit growers, who suspect it of pecking up young radishes and lettuces, as well as of picking out the buds of fruit trees. But almost every bird that is found near habi-

* The chaffinch was called *caelebs* by Linnæus, because of the supposed migration of females in Sweden, which left the male celibate.

tations is charged with these offences, of which many of them are innocent. During hard winters the chaffinch is found frequently in the company of the house sparrow and the green linnet, many of whose depredations are attributed to the former. The sparrow and green linnet are known to peck radishes and lettuces, and to pick off the leaves of many early spring plants, so that their mischief may easily be attributed to the chaffinch, which congregates with them in the winter months.

This bird is naturally inclined to a seed and insect diet, and when radishes and other garden crops are above ground and lettuces planted out, there is a considerable amount of insect food obtainable. During the winter the chaffinch's natural food consists of the seeds of all kinds of plants and weeds, and grain, if it comes in its way. It is often seen in hard winters in poultry yards, picking up tail corn, meal, and other chicken's food; in farmyards, in stack-yards, and on dung heaps, in company with other birds. In the late autumn, and when the weather is open in winter, it is found hunting in corn stubbles for fallen corn, and in stubbles and other fields for the seeds of charlock, wild mustard, groundsel, chickweed, knot grass, buttercups, and other weeds troublesome to cultivators.

If this bird does feed on radishes and lettuces when there is a dearth of its normal food, it is easy to protect the plants with guards of wire netting until insects are plentiful and nesting commences, which takes place early in the season, and at that time insects form its principal food. These guards would also keep off the sparrows, which are well known to attack the young succulent vegetables. The charge of picking out fruit buds is not proved. The chaffinch has doubtless been seen pecking at the opened blossoms of fruit trees, and causing the petals to fall; but this is for the purpose of getting at caterpillars, such as those of the winter moth, and not from wanton mischief, as its detractors imagine.

Many fruit growers, and all who are careful observers, regard the chaffinch as one of their best friends; and as it is especially fond of building its nest in an apple tree, while there are as a rule two generations, the quantity of insect

food which a single pair and their progeny will consume is considerable. Stevenson, in his "Birds of Norfolk," writes: "As soon as the young are hatched there are no birds so assiduous in their useful occupation of clearing our gardens from insects as the chaffinches." Such small insects as aphides and *Psyllæ* are taken, as well as the caterpillars of the several moths that sometimes entirely strip fruit trees of leaves and blossoms. The destructive larvæ or grubs of the gooseberry sawfly (*Nematoc ribesii*) are cleared off quickly by the old chaffinches and their fledglings. It was stated by several farmers that the chaffinch was very useful in clearing off quantities of the caterpillars of the Diamond Back Moth, which were so destructive to swedes, turnips, and cabbages, in 1891. Selby speaks of its assiduity during the autumn in devouring the females of a large species of aphid (probably *Lachnus pini*) that infests the trunks and branches of the larch and various kinds of fir. It not only destroys insects in their larval state, but it catches flies, moths, and beetles, upon the wing. In short, it is almost exclusively insectivorous from May until September, and during the rest of the year it subsists upon seeds of weeds, berries, and any grain that it can obtain, as well as insects in the egg or pupal state which its sharp eyes readily discover in their quarters of hibernation. In his valuable work on the "Birds of Somerset," Cecil Smith quotes the following passages from the *Zoologist*:—"So large is the number of seeds of weeds that the chaffinch consumes in the course of the year, more particularly of groundsel, chickweed, and buttercup, that he without doubt more than compensates for all his misdeeds, and as his summer food partially, and that of his young exclusively, consists of caterpillars and other noxious insects, he is assuredly the gardener's best friend."

The chaffinch, "chinker," or "pink," so called on account of its peculiar note of "chink chink," or "pink pink," which it utters, especially in the breeding season and when it is disturbed, is a permanent habitant of the United Kingdom. The male is very slightly larger than the female. It is a pretty bird, having much variety in its colouring. The underpart of its body from the base of the beak to the flanks is a

rich chestnut-brown, with a tinge of lighter chestnut, approaching to pink, below the flanks. The head, back, and upper parts generally, are bluish, or slate-coloured, down to the rump, which is of a light green hue, and the tail is dark brown with whitish edges to the feathers, with the under parts whitish. The ground colour of the wings is black, with white edges and bars and patches of white upon them. The beak is greyish-blue in spring and summer, and flesh-coloured during the winter. The legs and feet are brown. The female is not so brilliant as the male, nor so variegated in colour. Her ground colour is more brown in the upper parts and lighter in the lower parts of the body.

The continuous "chink, chink" of the birds and their excited actions near the nests betray their situation. The nest is usually built in deciduous trees in the forks made by branches, and very frequently among or upon the interlaced branches of apple trees. Though the situation and the particular tree are indicated by the anxious birds, the nest itself is difficult to discover, as it is designed in imitation of its surroundings. A nest in an apple tree, for instance, is arranged with hair, grasses, moss, feathers, rootlets, and lichens woven with these to make it resemble the apple branches among which it is placed. It is a beautiful structure and the most elaborate nest made by any British bird, except perhaps that of the "Bottle Tit" (*Parus caudatus*) and the Golden Crested Wren (*Regulus cristatus*).

The female usually lays four or five eggs, though six are occasionally found. The egg is pale green or greenish-grey, sometimes with a pink hue, thickly covered with reddish-brown markings of all shapes. There are two broods in the year. The young, according to Seeböhm, are soon left to themselves by their parents, and feed upon all kinds of insects during the summer.

In France and in Germany the chaffinch is regarded as a useful friend to cultivators, especially by fruit growers.

ENGLISH ORCHARDS.

Part III.

Although there has been much neglect of orchards and fruit plantations in many parts of the country, as has been shown in the earlier portion of this article, it is yet satisfactory to observe that examples of fruit land cultivated in a rational and intelligent manner are becoming less uncommon, and that there are signs that fruit growers are awakening to the consciousness that their industry can never pay so long as it is conducted upon the old lines, and that it will pay, in spite of the competition from foreign countries, if it is carried out upon improved and intensive principles.

In some cases apple and pear growers, with whom this article is mainly concerned, have been handicapped by their succession to orchards and fruit-plantations in a deplorably neglected condition, and the task of effecting an improvement has promised to be of so difficult and tedious a character that their efforts in this direction have been discouraged. Others have introduced fresh sorts, but have failed to make the trees pay owing to the varieties having been injudiciously selected, and to improper cultivation. But there are cases where the work has been done in the right way and has been thoroughly successful: varieties of fruit suitable to the localities and to the requirements and tastes of the public have been selected, and the trees have been carefully cultivated and kept free from lichens, mosses, insects and fungi.

Considerable impetus has been given to fruit planting in many districts by nurserymen who have devoted skill and ability to the development of improved varieties by selection and cross fertilisation, and have brought within the reach of growers good vigorous trees of approved varieties, true to name, at reasonable prices. Nurserymen and gardeners on large estates have also done good work, and set excellent examples

in their respective localities by the production of fine typical specimens of all kinds of fruit for exhibition at shows. These shows have not only enabled fruit growers to see what kinds can be successfully grown in particular districts, but they have also brought under their notice new varieties possessing desirable characteristics, and have taught them to appreciate the effect of skilful treatment upon the size, appearance, and quality of the fruit. Some County Councils, too, are assisting in the work of improvement by the provision of lectures on fruit culture. The increased interest which has recently been manifested in the manufacture of cider and perry in this country has encouraged nurserymen in districts where cider and perry fruits are grown to turn their attention to the reproduction of the true types of old varieties celebrated for their cider and perry making qualities, as well as of new sorts suitable for these purposes.

An important development in fruit culture in recent years has been the extension of the system of growing fruit upon dwarf trees, bushes or pyramids, and upon half standards. There are other forms, as cordons, single and double upright, horizontal, and slanting, but these are more suitable for gardens. Many dwarf and pyramidal apple and pear trees, and half standards, are planted in gardens and shrubberies as ornamental trees, both for their wealth of blossom in May, and of pretty coloured fruit in September and October. Though this system of dwarfing fruit trees was introduced from France more than forty years ago, it has only been practised upon anything like a large scale since 1875, but it is now extending very rapidly. The dwarf trees are obtained by grafting apple scions upon what is known as the Paradise stock, and pear scions upon the quince stock. The advantages claimed for dwarfs are that they yield a quick return; their fruit is of good quality, as training and pruning can be easily, and therefore systematically, done; and they can, without much difficulty, be kept comparatively free from the numerous insects and fungi that attack apple and pear trees. Dwarfed trees come into bearing in the second year, and, if properly managed, yield for a long period large crops of fruit of fine flavour, large size, and good colour. They have been

already planted to some extent by farmers who grow fruit for sale upon their farms, and they have been very largely adopted by market gardeners who combine fruit growing with the production of vegetables, as well as by others who grow fruit for sale or for their households. This method of fruit-growing has been taken up as a business by those who would not have dreamed of undertaking it before dwarf trees were in vogue, and by cottagers and allotment holders, who could not otherwise grow fruit with advantage.

Plums are also grown as half standards and as bushes, and many acres have been planted with bush plum trees in the past few years. The fruit grown in this way is, as a rule, finer and better coloured, and the trees can be pruned or pinched, and cleansed from insects, lichens, mosses, and fungi, far more easily. Root pruning, which is of great advantage in certain circumstances, can be adopted in a far more easy manner. Cherries are extensively grown upon half standards and bushes, but half standard cherry trees are generally preferred to bush trees, where this fruit is produced upon anything like a large scale.

In the selection of varieties of apple trees for planting, consideration should be given to the soil, subsoil, climate, situation, and other circumstances of different districts or localities. But there are certain varieties which have been planted very generally, and appear to flourish in most varying conditions. For instance, Cox's Orange Pippin, which is decidedly the finest apple known in this or any other country, thrives as well in Worcestershire, Gloucestershire, Middlesex, and Surrey as in the loams of Kent, though its size, colour, and general excellence naturally vary according to the quality of the land. The Worcester Pearmain, a beautifully-coloured variety, has also been largely planted, and has done well in most places where the conditions are at all suitable. The following early varieties of dessert apples have also been planted in different districts with success; they are given in order of ripening:—Mr. Gladstone, an early apple of the finest quality; the Quarrenden, a most suitable, well-coloured sort; Irish Peach, Duchess of Oldenburg, and Summer Golden Pippin or Ingestre. Among later

and keeping varieties, the following may be named :—Blenheim Orange, Cox's Orange Pippin, Gascoynes Scarlet Seedling, Court Pendû Plat, Baumann's red Reinette, and Ribston Pippin, which has been revived in a good form. The King of the Pippins is grown extensively in many places, but it requires good, deep soil and sheltered spots, in which it grows fine and clear ; in shallow or unsuitable soil it grows spotty.

Of cooking apples the following are the sorts generally planted now :—The early Julien, Lord Suffield, Lord Grosvenor, New Hawthornden, Stirling Castle, Ecklinville Seedling (an admirable apple, and doing well in most places), Warner's King, and Cox's Pomona, a brilliantly coloured apple. These are sent to market direct from the trees. Among cooking apples for storing, the principal varieties now selected are Blenheim Orange (which is also a good eating apple), Peasgood's Nonsuch, Queen Caroline (a lovely apple when well grown), Lord Derby, Stone or Loddington, Golden Noble, Wellington Alfriston, Prince Bismarck, Lane's Prince Albert, Winter Queening, Bramley's Seedling (a most useful apple, and being largely planted), Royal Jubilee, and Northern Greening. One large successful grower of apples on bush trees has planted for succession : Lord Suffield, Ecklinville, Lord Grosvenor, Domino, Lord Derby, Bramley's Seedling, Lane's Prince Albert, and Royal Jubilee. For eating apples he relies principally upon Worcester Pearmain and Cox's Orange Pippin. Another, who grows on standards and on half-standards, has planted, for cooking purposes ; Domino, Newton Wonder, Stone, Stirling Castle, Warner's King, Prince Bismarck, Lucombe's Seedling, and Bramley's Seedling ; while for eating purposes his selection is : Mr. Gladstone, Yellow Ingestre, Worcester Pearmain, Duchess's Favourite, King of the Pippins, and Cox's Orange Pippin. The majority of these are early sorts, of good colour, which attract the eye, and are ready for sale before the American and Canadian apples arrive in this country. By thus growing early apples all the expenses and risks of storing are avoided.

The varieties of pears that have been planted of late years

by farmers, fruit-growers, and market-gardeners are Clapp's Favourite, Doyenne d'Été, Jargonelle, Williams Bon Chrétien, Hessle, Beurré de Capiaumont, Fertility (a most valuable variety), Beurré Clairgeau, Beurré Riche, Beurré de l'Assomption, Pitmaston Duchess, Marie Louise, Doyenne du Comice, Glou Morceau, and Easter Beurré.

All the varieties of apples and pears named above have been proved to be suitable as bush trees and half-standards, and flourish upon soils where apples and pears can be ordinarily grown successfully.

There are several modes of arranging apple and pear bush trees and half-standards, depending mainly upon the soil and situation. In some cases bush or dwarf trees are planted alone, at distances varying from 8 feet (680 bush trees to the acre) to 10 feet apart (435 trees to the acre), and neither fruit bushes, raspberry canes, nor any other crops, except perhaps vegetables or strawberries, are planted between the bush trees for the first two or three years. It is held that by this system the crop of apples and pears is far better in quantity and quality than when bush fruit or other crops are grown between the trees. Occasionally a plantation is seen in which the apple and pear bush trees are only 6 feet apart, giving 1,210 trees per acre; but this is too close—at least upon good land. Another arrangement is to put standard apple or pear trees 30 feet apart (48 trees per acre), and to set bush trees of apples and pears between them, 15 feet apart, which come quickly into bearing and are removed when the standards are fully developed. Sometimes, between the bush trees or dwarfs, gooseberries, currants or raspberries are put in; but after some years it is necessary to remove these, as they interfere with the dwarf trees, which are themselves in turn also removed.

A good arrangement is to plant half-standard plum trees and half-standard apple trees in alternate rows 15 feet apart, or 192 trees per acre. When the apple trees begin to encroach upon the plum trees the latter are pruned away, and finally removed when the apple trees require more space. Fruit bushes (gooseberries and currants) are sometimes planted between the plum trees and apple trees, and are

taken out when they encroach upon the permanent trees. A well-known successful grower puts half-standard apple trees or plum trees 15 feet apart, set triangularly, and strawberry plants at a distance of one and a half feet from plant to plant in the row, and two and a half feet from row to row. He varies this by planting currant or gooseberry bushes between the rows of half-standards, and strawberry plants between the spaces of the rows of half-standards. Sometimes raspberry canes are substituted for the gooseberries and currant bushes for the strawberries. Raspberry canes are set in two rows between the rows of half-standards, five feet apart from row to row, and two and a half feet apart from plant to plant in each row, with plants between the half-standards in their rows.

There are other arrangements of standards, half-standards, bush-trees or dwarfs, and bush and other fruits which have been adopted in late years with the object of getting as much fruit as possible from the land, and of providing that if one kind of fruit fails another may have a chance of succeeding.

It need hardly be said that this intensive system of cultivation requires that the land should be heavily manured. The growers who work after this new and improved fashion are, however, fully alive to the necessity of the most liberal treatment of the land and of the most up-to-date methods of cultivation and management. The example of these enlightened growers, who are scattered here and there in all parts of the fruit-producing districts, is beginning to react upon those who have hitherto been content to remain in the old grooves, and whose inaction and want of knowledge have occasioned the lamentable condition of much of the orchard land of this country.

Not only have great improvements in cultivation and management of fruit land been made by what may be termed the new school of growers, but they have also to some extent amended the subsequent treatment of fruit in respect of picking, grading, storing and packing, and especially as to the proper time for sending it to market. It is too frequently the practice to literally tear off fruit from apple trees and to

thrust it into bags tied round the pickers' waists; the apples are afterwards jerked out of the bags into baskets, and, after being conveyed in jolting carts or waggons, are ultimately poured from the baskets into heaps in a barn, granary, or outhouse. The fruit is sadly bruised by this rough treatment, and much of it often decays or shows discoloration in the storage. If gathered ripe and despatched to market at once, the fruit is treated in exactly the same manner, so that in a day or two it shows bruises and blotches, and quickly becomes rotten. The improved method is to have the fruit picked into baskets with a swinging handle and a hook, by which it may be hung on the ladder. Apples, pears, and plums are put carefully into these, and when the baskets are full they are emptied slowly and carefully into the large baskets or barrels used to convey them to the stores. These baskets or barrels are conveyed in vans having springs, and the fruit is picked out by women, all the bruised and "specky" fruit being put on one side. When dealing with ripe fruit for immediate despatch to market, the pickers' baskets are emptied very carefully on the grass, or on a floor, and even in a few special cases on to sheets of felt. The fruit is then "graded" and put singly into the baskets, barrels, boxes, or other packages; specked, decayed, and very small and mis-shapen fruit being eliminated. A few advanced growers put tissue paper round choice fruit, such as superfine Cox's, fine plums, and best pears; and in some cases the baskets are lined with coloured paper, which helps to display the fruit to better advantage, and paper is put between the layers. Another improvement adopted by the few is the use of smaller sized baskets than the bushel and the half-bushel, and of boxes or cases, which pack better into railway cars, and thus serve to protect the fruit from getting bruised.*

Such rational methods of treatment are, however, exceptional, and, speaking generally, there is room for much improvement in the picking and subsequent handling of fruit in this country.

* See also article on "Fruit Farming" in Vol. I. No. 2 (December, 1894) of this Journal.

BENEFICIAL INSECTS.

Among the insects which are of great service in destroying other insects that are injurious to crops, the ladybirds (*Coccinellidæ*) are probably the most prominent. There are many species of these, which prey on various kinds of crop pests in every country of the world. Perhaps the most noteworthy is the *Vedalia cardinalis*, introduced from Australia, which has done very great good in the orchards of America by clearing off the scale insect, *Icerya Purchasi*, so destructive to almost all kinds of trees in that country. In the opinion of many entomologists in the United States, this scale insect would have caused great injury to American fruit crops, as it was spreading rapidly, if the *Vedalia* had not been introduced by the late Professor Riley, and carefully protected by those interested in fruit culture.

There are several species of *Coccinellidæ* in Great Britain which are of inestimable benefit to farmers, fruit growers, and gardeners, as they live principally upon aphides and minute fungi, such as the *Ustilagineæ* and *Peronosporæ*. Professor Forbes, of Illinois, in a treatise upon the "Food Relations of the *Carabidæ* and *Coccinellidæ*" gives the result of a series of dissections of species of the latter family of beetles, with a view to ascertain the nature of their food.

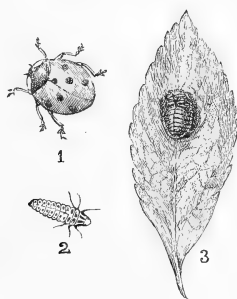
The result of these examinations was that the food of the *Coccinellidæ* was on the whole simple and uniform, consisting almost wholly of plant lice, spores of fungi (*Cladosporium*, *Uredo*, *Septoria*, *Helminthosporium* and *Peronospora*) and pollen grains. The food varied but little in the different genera of this family. In all cases the perfect or adult insects were examined; no larvæ were dissected, but it would probably have been found that they had eaten a far larger proportion of animal than of vegetable food. The ladybirds, when in the beetle stage, are not nearly so intent upon feeding as their larvæ, but seem more bent upon finding convenient spots for egg-laying and basking in the sun. Their mouth organs are not so well adapted for eating plant lice as the

formidable hooked apparatus of their larvæ, which seize and devour their prey like famished dogs.

The proportion of fungi and pollen eaten by the larva is relatively insignificant compared with that consumed by the perfect beetle, which can fly from place to place, and can get a variety of food, while the larva is confined to a few leaves. It has been noticed that the perfect beetle will rest upon the congeries of spores formed by fungi; as, for instance, upon those on the leaves of the hop, and of the potato, apparently feeding upon the spores. Eggs are not laid in or near these centres of fungi, but are placed, as a rule, upon leaves where plant lice exist, in order that there may be an abundance of suitable food when the young larvæ emerge.

It is not denied that the perfect beetles eat aphides; it is only stated as the result of observations that they prefer, and can assimilate better, spores of fungi and grains of pollen—vegetable diet, in short. This insect is, then, in its perfect and larval stage, of great value to cultivators, and should be encouraged in every possible way. It was the custom not long ago to ruthlessly kill ladybirds, to sweep them from the corners of rooms where they had congregated for the winter, chiefly in houses with a southern aspect, and to put them into the fire. Even in these days some persons destroy them without scruple.

THE SEVEN-SPOTTED LADYBIRD (*Coccinella septem-punctata*).

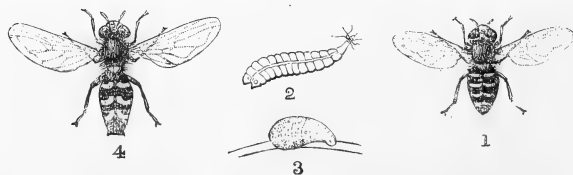


1, Perfect Insect; 2, Larva; 3, Pupa.

There are several species of *Coccinellæ* actively useful in the destruction of aphides and fungi, of which two, *Coccinella septem-punctata* (the ladybird with seven spots) and *Coccinella bi-punctata* (the ladybird with two spots) are by far the most common. An illustration of the former is given above.

The beetle (1) comes from its winter quarters in the spring when the sun begins to shine with some power. It roams from plant to plant, living on fungus spores, pollen, and aphides, and lays eggs upon the under sides of the leaves of infested plants. The eggs, which are long, cylindrical, and yellow, are set on end in groups of from seven to nine. In about eight days the larvæ (2) come out; they are called "niggers" in many places, because they look black, but on close observation it will be found that they are slate-coloured, and have a yellow tinge and some scarlet spots upon their backs. Directly they come from the eggs they commence feeding upon aphides near them. When fully grown they are rather more than a quarter of an inch long. After feeding for about seventeen days, during which they devour incredible quantities of aphides, they change to black pupæ (3) with orange-coloured spots, which are firmly attached to the under-sides of leaves. The pupal state lasts about thirteen or fourteen days, when the perfect ladybird appears. There are several generations if the season is fine and food is plentiful. At the end of the season the ladybirds seek shelter in houses, granaries, barns, and outhouses, in the interstices of walls, the cracks of palings, posts, and hop-poles, and under the bark of trees. Generally they are found congregated together, probably for the sake of warmth. At the end of the summer, swarms of these little beetles may be seen in the air, or on the sides of houses and other buildings, previous to hibernation. It need hardly be said that they should be encouraged in every possible way, as they are in France and Germany, where they are regarded as the best friends of the cultivators. In the former country they are called *Bêtes à bon Dieu*, *Bêtes de la Vierge*, and in Germany *Marienkäferchen*.

SYRPHIDÆ.



1, *Syrphus ribesii*, male; 2, larva; 3, pupa; 4, *Catabomba pyrastris*, female.
All natural size.

Among other destroyers of aphides, some species of *Syrphus*, a genus of the *Syrphidæ*, rank next in usefulness to the *Coccinellæ*, especially the species known as *Syrphus ribesii*, *Syrphus balteatus*, and *Syrphus vitripennis*. There are several other species of this genus of this large family of dipterous insects which feed upon aphides, especially one defined as *Catabomba pyrastris*; but the three mentioned are the most common. It is the larvæ alone of these insects that feed upon aphides. The *Syrphus* flies do not eat them, but are seen in summer weather flying round flowers and blossoms, from which they appear to obtain food in the shape of honey or pollen. Meigen says that they may be seen flying very rapidly, and occasionally resting, or hovering in the air for a brief space, from early spring to late autumn. Meigen also remarks that their flight is quick, and is taken by fits and starts. Curtis remarks, "These flies are so numerous as to be in a great measure the cause, I believe, of the incessant vibration of the air or buzzing, which we have in the country on fine, still, sunny days in the summer and autumn months." They somewhat resemble small wasps, so that, as Westwood suggests, they are constantly mistaken for them by the inexperienced. They are found in large swarms towards the end of the summer, especially the species known as *Syrphus ribesii*, *Syrphus balteatus*, and *Catabomba pyrastris*.

The species that is most common, or which was the most common during the summer and autumn of 1898, is *Syrphus ribesii*. There are three or four species which are very much alike, and are known as the *ribesii* group, but each has distinctive characteristics, and the insect described here is the *Syrphus ribesii* proper, as defined by Meigen. It is nearly half an inch long with a wing expanse of close on an inch. The head is bright yellow, with reddish black antennæ, the third joint of which is pale underneath, and copper coloured eyes, the legs are ochreous, with the tarsi black or reddish black. The thorax is dull green, and the abdomen, which is broader in the middle part, is black, having black hairs and four honey-yellow bands crossing it, slightly notched or nicked with black. The wings are clear, but have dark yellow borders. The male is rather smaller than the

female, and, as in most of the *Syrphidæ*, the eyes of the male (No. 1) meet on the front, but are distinctly apart in the female. Eggs are laid singly, upon leaves infested with aphides, and from them larvæ quickly come. The larva (No. 2) is of a dirty yellow colour, long, with a tapering head, and its mouth is furnished with a three-pronged harpoon for transfixing its prey. The body is flask-shaped at the hinder end, and smooth, with a somewhat transparent skin and a few transverse lines. It has no legs or eyes, and thrusts out its long neck on every side in search of its prey, which it instantly harpoons and holds up in the air, shaking it as a dog shakes a rat. The quantity of aphides killed and eaten by one of these larvæ is incredible. Curtis says that one will devour 100 in an hour. All kinds of aphides appear equally acceptable to these larvæ. Some kept in a glass case were fed with the aphides of the turnip, rose, hop, geranium, apple, plum, currant, lime, and carrot, and they devoured them quite indiscriminately. In from twelve to fifteen days the larva attaches itself to the leaf or stalk of the plant on which it has lived, and changes to a flask-shaped pupa within its own skin. The pupa (No. 3) is of a dull brown hue, with indistinct spots upon it. There are at least two generations of this insect during the summer. In a season like that of 1898, when aphides of all kinds were unusually abundant, there appeared to be three, or more, generations. The pupæ are seen not only on the leaves, but also upon the stems or stalks of plants, and might be safely preserved on these during the winter. Those on the leaves fall to the ground and are probably destroyed, but it would appear that the hibernation of the insect has not been clearly ascertained. Large swarms of these flies are constantly seen in the autumn, which lead to the supposition that, as in the case of wasps and some flies, hibernation may take place in the perfect state. There are such immense quantities of these flies at the beginning of the summer, and their appearance is so early, that it would almost appear as if this were so. Dr. Meade, the well-known dipterist, however, does not think that this form of hibernation prevails with the *Syrphidæ*. It has been noticed that pairing occurs among the flies in the swarms during the

autumn. It may be that the female then deposits eggs upon trees, shrubs, and plants, which are hatched in the early spring.

Another larger species of the *Syrphidæ*, defined as *Catombomba pyrastræ*, is shown in the illustration, No. 4; the habits of this are identical with those of *Syrphus ribesii*.

These insects should be protected in every possible way, and their great services to cultivators fully understood and recognised. It is held by no means infrequently that they are injurious to crops, and the Board sometimes receive specimens of the larvæ found upon turnips and other leaves with a request for information as to the "new insect pest." In many instances hop-growers are not alive to the usefulness of the larvæ of the *Syrphi* in reducing the number of the aphides upon the hop-plants, though in this case but little reliance is placed upon the efforts of insects such as the *Coccinellæ*, the *Syrphi*, and Lacewing flies (*Chrysopæ*), as the plants are systematically and frequently sprayed with various insecticides and insectifuges which clear away foes and friends alike. If the balance of nature were allowed to adjust itself, wholesale attacks of insects such as now affect various crops would probably not occur, but it is altogether interfered with by artificial systems, the destruction of insectivorous birds, and the want of recognition and encouragement of insectivorous insects.

THE LACEWING FLY (*Chrysopa vulgaris*).

The larvæ of this fly are also great destroyers of aphides, and may be found upon all kinds of trees and plants where these pests occur. There are several species of this genus of insects, *Chrysopinæ*, of the order *Neuroptera*, in this country. The chief species is known as *Chrysopa vulgaris*, a very pretty delicate fly with long wings looking like fine gauze. When at rest the wings are folded upwards over the back. Its body is pale green, and it has very prominent large eyes of the colour of shining gold, so that it is often termed "golden eyes." In length it is nearly half an inch, with four wings and six short legs. This fly has a most dis-

agreeable odour. It appears at the end of May and deposits eggs on the plants. The white eggs are laid in groups of seven to nine on leaves, or upon twigs or stalks, each egg being placed upon a footstalk with a thread about half an inch long. From the egg the larva appears in seven or eight days and at once begins to devour the aphides near. It is slate coloured, with red marks on it, nearly the fourth of an inch long, and covered with tufts of hair, having a long flexible neck and strong hooked jaws. It remains in this stage for about fifteen days, and changes to a pupa in a spun cocoon about the size and shape of a sweet pea. There are several generations during the year, if food abounds and other conditions are favourable, and hibernation takes place in the pupal stage upon twigs and stems of trees and plants.

It has been noticed that the larvæ of this fly are great destroyers of the apple-sucker (*Psylla mali*), which does so much harm, as well as of the apple aphis (*Aphis mali*), and the flies may be seen upon apple-trees in the spring and summer months, while the larva can be discovered on the leaves and blossoms, clearing them of the pests which infest them. The larvæ have also been frequently seen upon swedes infested with aphides, as well as on hop-plants and currant-bushes, and like the *Syrphus* larva they do not appear to be particular as to the species of aphis they eat.

ICHNEUMON FLIES.

There are many species of ichneumon flies, belonging to several families of the order *Hymenoptera*, which do great service by placing their eggs either in the larvæ or the pupæ of many species of insects injurious to farm and garden crops. These flies are generally brilliant in colour, with iridescent wings, and from the fourth to the sixth of an inch long. The larvæ or maggots which come from the eggs feed upon their hosts and destroy them. Thus the troublesome aphides, besides the other enemies that have been described above, are frequently infested by several species of the genus *Aphidius*, whose larvæ completely scoop out the insides of

their victims. This is especially noticeable in the case of the corn aphid (*Aphis avenæ*) and of the hop aphid (*Phorodon humuli*). Another of the same order infests the destructive ribbon-footed corn fly (*Chlorops taeniopus*) and sometimes materially diminishes its numbers.

At the time when so much fear was felt that the Hessian fly would cause great mischief in British cornfields, in 1886, it was discovered that this insect was liable to extensive infestation by one of the ichneumon flies (*Semiotellus nigripes*). Professor Riley, the late United States Entomologist, stated that this parasite of the Hessian fly was not known in the United States, and he was so impressed by the reports of its action that he accepted Mr. Enock's offer to send him some for distribution in that country. With regard to this fly Professor Riley reported as follows in 1894:—"Parasitised puparia of the Hessian fly were received in large numbers and distributed to various points, and placed in the hands of competent observers. The results so far have not been marked, and but one positive report as to the acclimatisation of the parasite has been received—viz., from Professor S. A. Forbes, of Champaign, Illinois. I am, however, of opinion that the lack of evidence is due almost entirely to lack of proper examination, and I have every hope that the species before long will be found to have obtained a secure foothold at all the several points of distribution. It is very difficult to ascertain the existence of a parasite of this minute size, except where it occurs in great numbers. The reason for attempting the introduction of this particular species was simply that in England it was found to be far more abundant and far more beneficial than any of our native species have so far proved."

It is due to this ichneumon fly, as well as to the unfavourable climatic conditions, that the Hessian fly has not caused any important harm in Great Britain. The fly is only about the eighth of an inch long, with a wing expanse of about the fourth of an inch. It is black, with yellow colourings on parts of its body, and a metallic lustre upon the thorax.

There are many other species of the *Hymenoptera* which parasitise and destroy noxious insects; as, for example, the

tiny flies *Platygaster tipule* and *Macroglenes penetrans*, which infest and destroy the wheat-midge (*Cecidomyia tritici*) and *Pachymerus calcitrator*, a parasite of the corn saw fly (*Cephus pygmaeus*).

In some seasons these beneficial flies are so numerous as to completely check the destructive progress of the insects they parasitise, and it may almost be said that the increase or decrease of the latter, and their dangerous effects upon crops, depend upon the number of their enemies.

OUR IMPORTS OF HONEY.

Bee-keeping, which has been called the "poetry of agriculture," is a branch of rural economy for which provision is made in the schemes of agricultural instruction of a number of English County Councils, while in Ireland the progress of apiculture forms the subject of an annual inquiry by the Registrar-General. Societies and clubs for the promotion of bee-culture have been formed in many parts of the country and their numbers are steadily increasing. There are 30 country and district societies affiliated with the British Bee-Keepers' Association, and the council of this latter body hold that the attention now being given to the formation of new societies and clubs of bee-keepers cannot fail to have a marked result in the development of bee-keeping and honey production. In the absence of complete statistical information for Great Britain it is, however, difficult to obtain any satisfactory estimate of the production of honey in the United Kingdom as a whole. The agricultural statistics for Ireland have for some years past furnished particulars relative to the extent to which bee-keeping is followed in that country. The first Irish enquiry was made in 1885, when the production of honey was estimated at 302,000 lbs., of which 105,400 lbs. was produced in hives with movable combs, and the remainder in other hives. In the ten years subsequent to 1886 the annual output of honey ranged from 192,000 lbs. to 459,000 lbs.; the average for the period being 300,000 lbs. The latest published returns show that the number of stocks brought through the winter of 1896-97 was 16,503; of which 7,761 were in hives having movable combs, and 8,742 in other hives. The yield of honey in the season of 1896 amounted to 275,000 lbs., and of beeswax to 3,832 lbs.

During the past five years the annual importation of honey into the United Kingdom has averaged 2,250,000 lbs., of the

declared value of £31,000, or about 3½d. per lb. Among the countries engaged in supplying our markets with this product the principal are the United States, Chili, and Peru, the other contributors including the British West Indies, France, Australasia, Canada, Germany, Italy, and the Spanish West Indies. A few paragraphs on the position of the bee-keeping industry in some of these countries may not be without interest.

From the United States we usually receive about one-third of the total quantity imported, and about the same proportion is furnished conjointly by Chili and Peru. No particulars are available with regard to the production of honey in the United States since those collected at the census of 1890, when it was ascertained that the yield from the hives then in existence was nearly 553,000 cwts. in the twelve months, the production of beeswax in the same period being 10,000 cwts. The industry is principally confined to the central and north central States drained by the Mississippi, the only State on the Pacific slope where bee-keeping is of any importance being California, while on the Atlantic side New York, Pennsylvania, and North Carolina are the chief honey-producing States. Most of the honey exported from the United States is shipped to Great Britain.

In France returns relating to apiculture are annually collected by the Ministry of Agriculture. The production of honey in 1896 was estimated at 17,000,000 lbs., which was somewhat above the average, and the number of hives in the country was 1,623,054. These figures do not materially differ from those ascertained at the more detailed Decennial Inquiry of 1892, when 147,300 cwts. of honey and 47,000 cwts. of wax were estimated to have been produced from 1,603,572 hives. In the published report on the results of the Decennial Inquiry the following comparative statistics are given of the number of hives in France and other countries in 1892:—France, 1,603,572; Austria, 920,640; Denmark, 122,500; Sweden, 93,180; and Ireland, 21,163. There is an average exportation of about 20,000 cwts. of French honey annually of which the greater part is sent to Belgium and Holland. The successive Decennial Inquiries of 1862, 1872, and 1892

indicate a considerable falling-off in the French production during the past thirty years.

In Germany apiculture was formerly a popular occupation of the small farmers, but in recent years it appears to have lost much of its attraction for the German peasantry, and the paucity of the products of bee-keeping exhibited at local agricultural shows is a subject of frequent complaint. The reasons for this decline are said to be the unremunerative prices obtained for honey and wax and the greater cost incurred in maintaining the bee stocks through a series of bad seasons. Nevertheless, bee-keeping is still followed with success in many of the heath districts of Prussia, Saxony, and Bavaria, and efforts are being made by local societies to revive this minor rural industry in localities where it formerly flourished. In Bavaria there were 355 such associations in existence in 1896. Information is not forthcoming as to the production of honey in Germany; but for some years past the imports into the Empire of this product have exceeded the exports. In 1883 an official enquiry was made into the extent to which bee-keeping was followed in Bavaria, and the number of stocks of bees then enumerated was 231,374.

Austria-Hungary is another country in which the keeping of bees is regarded as an important branch of rural economy; but here also the production of honey is not sufficient to meet the requirements of the population. In Hungary there is an increasing manufacture of honey-wine, and of liqueurs and vinegar from honey.

An article on the position of bee-keeping in Russia was published in an earlier number of this Journal (June, 1895). It is estimated that the number of hives in that Empire is not less than 2,000,000, and that the annual production of honey is about 321,000 cwts. But, compared with its former dimensions, bee-culture can no longer be regarded as an important occupation of the Russian people, although it is still practised all over European Russia and in many parts of Siberia. Up to the beginning of the eighteenth century wax and honey were exported in large quantities from Russia to Western Europe, the former product being sent for the most part to England. Apiculture in the Czar's

dominions was, however, practically destroyed by fiscal measures imposed during the reign of Peter the Great, and although this restraint was abolished in 1775, the industry has never recovered its former position. For some years past Russia has found it necessary to import honey and wax to meet the demands of her population.

In Canada statistics are annually collected of the number of colonies of bees in the Province of Ontario. In 1896 the number enumerated was 160,076, valued at £171,000, and in the previous year the number of stocks was 173,173, valued at £190,000. Apiculture has not made much progress in British Columbia, owing, it is believed, partly to want of knowledge, and partly to the scarcity, in the dry portions of the province, of a regular supply of honey-producing flowers.

Efforts are being made by the Agricultural Departments of several of the Australian Colonies to promote bee-culture, with the object of developing an export trade in honey. In 1895 a bonus of 1d. per pound was offered on honey exported from Victoria, with the result that a shipment was made in that year of 1,655 cwts., all of which came to the United Kingdom; but in the following season, when the bonus was withdrawn, only 54 cwts. of honey left the colony. The Government of South Australia endeavoured about the same time to create a trade in this product by making trial shipments, amounting in all to 824 cwts., during the season of 1895, but in this case also the trade practically disappeared in 1896, though there has since been some recovery. In New South Wales honey farming is receiving a considerable amount of attention. Hives are not only kept on many of the farms devoted to general agriculture, but there are also a certain number of establishments whose sole business is the production of honey and beeswax. The number of productive hives in the colony in 1897 was 41,900, and the yield of honey and wax was estimated at 1,378,000 lbs. and 31,800 lbs. respectively. In 1894 New South Wales exported to the United Kingdom 13,241 lbs. of honey; in 1895, 12,504 lbs.; and in 1896, only 2,640 lbs. Queensland sent nearly 65,000 lbs. of honey to the mother country in 1892, but her

contribution to our imports in 1896 was only 4,760 lbs. In 1897 there were 19,178 hives in this colony, and the production of honey was estimated 48lbs. per hive. An attempt is being made in Queensland to secure the co-operation of producers with the object of making regular consignments of honey to English markets. The total exports of honey to the United Kingdom from all the colonies of Australasia in the three years, 1894, 1895, and 1896, were 176,000 lbs., 539,000 lbs., and 61,000 lbs. respectively.

CONSUMPTION OF POTATOES IN THE UNITED KINGDOM.

The potatoes consumed in this country are for the most part of home production, imported varieties constituting only a very small proportion of our annual supply. The area devoted to the cultivation of this vegetable in the United Kingdom is, according to the latest agricultural returns, about 1,200,000 acres, whereas thirty years ago, when the returns were first collected, the extent of land similarly cultivated was estimated at 1,600,000 acres. The distribution of the crop at the two periods compares as follows :—

					Average Annual Acreage.	
					1867-71	1894-98
England	-	-	-	-	344,800	366,300
Wales	-	-	-	-	48,400	33,400
Scotland	-	-	-	-	173,600	128,100
Ireland	-	-	-	-	1,036,100	695,200
					<hr/>	<hr/>
					1,602,900	1,223,000

The loss of 400,000 acres in the total area is mainly due to a large contraction in the Irish acreage. In England and Wales there has been comparatively little change, the slight decrease in the Principality being more than counterbalanced by an extension in England. Relatively to population, the British area now represents an acre for every 68 persons of the population, compared with an acre for every 50 persons thirty years ago, while in Ireland, where a partial abandonment of the crop has been to a large extent consequent upon a reduction of the population, the personal ratio is now roughly equivalent to an acre for every seven persons as against an acre for every five at the earlier period.

Estimates of the quantity of potatoes produced in the United Kingdom, exclusive of the Channel Islands and the Isle of Man, have been published annually since 1884; but

for Ireland alone estimates of production are available for the past thirty years. The average estimated yield per acre during the past five years for the entire country has been 4.62 tons. The potato-fields of Great Britain alone yielded in that period 6.05 tons per acre; but in Ireland the average crop per acre turned the scale at only $3\frac{1}{2}$ tons.

The supply of potatoes available for consumption yearly since 1892 in the United Kingdom is shown approximately in the following table. Statistics of the exports of potatoes are published only in the annual statement of trade, so that the figures in the table are for calendar years.* It may be assumed that the crop of one season added to the net imports of the succeeding year will give, with a sufficient approach to accuracy for all practical purposes, the supply available to meet the requirements of the year subsequent to that in which the crop was harvested. This assumption has been followed in the preparation of the table below, which shows the home production after deducting $12\frac{1}{2}$ cwts. per acre for seed, the imports less the exports, the total supply available for consumption as food and for manufactures, and the supply per head of the population.

Year.	Acreage.	Home Production (Deducting Seed).	Net Imports.	Total Supply.	Supply per Head of Population.
	<i>acres.</i>	<i>tons.</i>	<i>tons.</i>	<i>tons.</i>	<i>lbs.</i>
1892 - -	1,265,386	5,299,181	117,252	5,416,433	318
1893 - -	1,251,556	4,851,734	52,148	4,903,882	286
1894 - -	1,221,544	5,777,128	79,324	5,856,452	338
1895 - -	1,251,703	3,879,858	174,139	4,053,997	232
1896 - -	1,269,406	6,271,256	93,163	6,364,419	361
1897 - -	1,182,130	5,524,404	172,045	5,696,449	320

Our average requirements of potatoes for all purposes would appear from the above figures to amount to about

* The exports of potatoes, of British, foreign, and colonial production, were not separately recorded in the Trade Returns until 1892. In that year the total quantity exported was 33,164 tons. The shipments in 1893 amounted to 892,580 tons; and in the following year to 558,650 tons, owing to large purchases by the United States; but the Transatlantic consignments have since fallen to inconsiderable proportions, and the total exportation of potatoes to all countries last year only slightly exceeded 24,000 tons.

5,500,000 tons yearly. Of this quantity all but 3 per cent. is furnished by the home production.

The Channel Islands and France are the principal purveyors of the small imported supply. From the former we receive annually nearly 60,000 tons, and the consignments from France amount to between 40,000 and 60,000 tons in the year. The imports from the Channel Islands consist almost entirely of early varieties which reach our markets before the British crop is ready for lifting, and consequently command a higher price. Their average declared value in recent years has been from 9s. to 9s. 6d. per cwt., whereas the French cargoes have usually been valued at 5s. to 6s. 4d. per cwt. Germany, Holland, and Belgium are the more important of the other countries distinguished in the Trade Returns as exporters of potatoes to this country. The gross supplies received from these and other sources during each of the past five years have been as follows :—

Country.	Year.				
	1893.	1894.	1895.	1896.	1897.
	Tons.	Tons.	Tons.	Tons.	Tons.
France - - -	44,317	44,799	65,242	37,595	57,337
Channel Islands - -	57,046	56,978	50,156	62,279	52,578
Belgium - - -	23,009	4,767	10,022	193	29,877
Holland - - -	7,696	13,557	11,922	2,418	28,103
Germany - - -	1,635	4,621	41,562	869	17,900
Canary Islands - -	2,926	2,937	3,448	5,049	2,862
Malta - - -	2,723	1,172	1,138	2,047	1,756
Other Countries - -	2,055	6,359	4,417	1,780	5,646
Total - - -	141,407	135,190	187,907	112,230	196,059

THE CATTLE INDUSTRY OF THE UNITED STATES.

In 1896 the Foreign Office issued a detailed report,* prepared by Mr. Hugh O'Beirne, Second Secretary at Her Majesty's Embassy at Washington, upon the statistics of oxen in the United States, and the condition and prospects of the supply of beef in that country. Some account of his conclusions was given at the time in this Journal, and the following later information is extracted from a subsequent report, drawn up by Mr. O'Beirne, and recently published by the Foreign Office.†

The number of "oxen and other cattle" was estimated by the United States Department of Agriculture on the 1st January, 1898, at 29,264,197 head, the decrease which set in since 1892, when the number was 37,651,000, having thus continued.

The greater part of the loss during the last two years has occurred in the south-western region (especially Texas), where a decline of nearly 13 per cent. in the number of oxen and other cattle is recorded. The great corn-growing and cattle-feeding region of the middle-west shows a comparatively small decrease, one State (Kansas) having an increase, while the ranching region of the north-west has suffered only a very small loss. The States of the Pacific slope have suffered rather largely in proportion to their cattle numbers, and all the more important cattle-producing eastern States show some diminution.

From a careful review of daily quotations on the Chicago Market, the "Chicago Live-Stock Report" finds the average price‡ for corn-fed "native" steers (or steers the product of

* Miscellaneous Series No. 403. See also *Journal of the Board of Agriculture* Vol. III., Dec., 1896, p. 257.

† Miscellaneous Series No. 481, price 2d.

The exchange is taken at £1=4 dol. 80 c. throughout this report.

the mid-western States, as distinguished from Texas cattle and north-western range cattle) during the year 1897 to have been 18s. 9d. per 100 lbs. (live weight), or 1s. 10½d. per 100 lbs. (about 11 per cent.) higher than the average price in 1896. The improvement has been sustained during the first six months of the current year, prices having remained, with no very great variations, at or about the level of the average of the year 1897.

Average Price of Fed "Native" Steers at Chicago.

Year.	Average Price per 100 lbs. (Live Weight).	
	s.	d.
1894 - - - - -	17	8½
1895 - - - - -	18	9
1896 - - - - -	16	10½
1897 - - - - -	18	9
1898 (January to June) - (about)	18	9

It will be observed that the prices in 1897 and the first half of 1898 have been on an average equal to the prices of 1895, in which year the values of fed cattle were temporarily raised by a scarcity of corn, which resulted in a considerable falling-off of the numbers sent to market.

This improvement in the prices of fed cattle cannot be regarded as resulting (immediately, at any rate) from the decrease, above recorded, in the total numbers of the American herds; inasmuch as the supply of finished cattle arriving at the markets during the last eighteen months of the period under review shows no signs of any falling off as compared with the previous year. It is true that the diminishing volume of the herd has been attended by a marked scarcity of young stock; but whilst the supplies of fed cattle continue to arrive in undiminished numbers, it is evident that the decreased bulk of the herd can scarcely be held mainly responsible for the fact that they have risen in price.

The recent rise in the price must be considered as the result chiefly of a marked improvement in the demand. One of the principal causes of the very low prices of 1896 was a great falling off in the American consumption of beef, the result of trade depression, which had lessened the purchasing power of the mass of consumers. With the recent improvement

in the general conditions of business there has naturally been a recovery in the country's powers of consumption. This improvement in the demand accounts to a great extent for the rise in the American price of fed cattle. But it must also be noticed that the decreasing volume of the herd has been attended, during the two years under review, by a marked scarcity of young stock cattle which, though not so considerable as to curtail the receipts of fed steers at the markets, caused a strong advance in values of feeding stock, and thus contributed to raise prices of all other classes.

Considerable light was thrown on this subject by an inquiry instituted last summer by the "Live Stock Report," of Chicago, into the numbers of cattle then on feed in the mid-western States compared with the numbers of the previous year. This inquiry showed that in most of these States feeding stocks were scarce and high, large tracts of land being reported to be wholly denuded of stock; and that where the young cattle were not scarce, it was only because the stock had been fully renewed by importation from the south and west. All these States had drawn largely for their supply on the south-western region (Texas, etc.) and the north-western range States, while some of them had imported stock from Canada and Mexico. The scarcity of young stock had thus led to two noticeable results: it stimulated the importation of foreign cattle, and produced a greatly increased movement of young cattle to the middle-west from other portions of the United States.

The imports of cattle have grown as the numbers in the country have diminished; and it is interesting to note that they now represent some three-fourths of the total number of live cattle exported.

Total Imports of Cattle into the United States.

Year ending June 30—	Number.
1892 - - - - -	2,168
1893 - - - - -	3,293
1894 - - - - -	1,592
1895 - - - - -	149,781
1896 - - - - -	217,826
1897 - - - - -	328,977
1898 - - - - -	291,555

The imports are practically wholly from Mexico and

Canada, which in the year ending June 30th, 1898, supplied 172,171 and 116,477 head respectively. The Mexican cattle are stunted and poor in quality, and the numbers available for export from the northern provinces are said to be running low. The Canadians are imported chiefly into the more northerly of the mid-western States, such as Ohio, Illinois, and Iowa. The ranchmen of the north-western States are said to find it more profitable to procure Canadian stock from the North-west Territory of Canada, even from points remote from the railway, than to buy young cattle in the United States. The duty on imported cattle under the Dingley Tariff is estimated to represent about 25 per cent. *ad valorem* on the average class of cattle imported.

It is, however, mainly from the south-western region (Texas, Arizona, and New Mexico) that the mid-western States have replenished their stock of young cattle, and the stock-growing industry of this region has been very noticeably affected by the rapid growth of the demand made on its resources. There are, however, two additional reasons for the great diminution in the number of oxen and other cattle in this region; namely, the rapid reduction in the carrying capacity of the Texas ranges, owing to exhaustion of pasture,* and the Texas fever. The presence of this disease greatly hampers the cattle industry of the southern States, as, with a view to the prevention of its spread, the export of cattle from the infected area is prohibited to all parts north of a line fixed by the Secretary of Agriculture, except during three winter months, or unless for immediate slaughter.

It need scarcely be said that the advance in prices of 10 per cent. has had a considerable effect on the rate of profits derived from the cattle industry.

In 1896 a comparison between the prices then ruling and the estimated cost of production led to the conclusion that, as regards breeders, while there was a large profit in raising cattle on the range, and a considerable profit in regions where pasture land and meadow were abundant and cheap, there were important parts of the cattle-growing region where,

* See the June number of this *Journal*, p. 62.

owing chiefly to greater density of population and the consequent dearness of pasture and hay, there was little profit in the business. As regards feeders, it was concluded that the business of fattening cattle for the butcher yielded a profit only under especially favourable conditions, and notably when the feeder grew his own corn; but a large proportion of the feeding was necessarily conducted at a loss. It was then evident that the recent reductions in the profits of cattle-raising had been largely responsible for the decrease in the numbers of the herd; and the prevailing low prices gave ground for anticipating a continuance of the decline in numbers, which has in fact taken place.

Conditions have greatly altered since then. Speaking of the change in the situation of herd-owners in the southwestern districts, which have no doubt profited as much as any others by the advance in values, a Western paper records the fact that many Arizona herds of 2,000 and 3,000 head of cattle, which were vainly offered for sale in the summer of 1896 at £2 and £2 8s. per head, have recently sold for £4 4s. and £4 8s.; and gives a typical instance of a cattle company which, having since 1892 levied annual assessments on its stock, has now resumed the payment of dividends. It is also a very significant fact that "cattle paper" is now reported to be once more good in the South. Cattle paper, or obligations issued by cattlemen on the security of their herds, has for some time been looked upon with general suspicion and disfavour in consequence of the heavy losses of recent years. Its recovery is the best evidence of the present prosperity.

The position of cattle-feeders is not quite so satisfactory as that of breeders, as the great demand for young cattle kept the prices of stores at a level little below those of finished cattle. Still, business does not appear to have been so unremunerative as to have any marked tendency towards discouraging the industry.

It appears from the foregoing summary account that what scarcity of stock cattle there has been during the two years under review must be regarded for the present as a permanent element in the situation. There has been a great accession of activity in the breeding business, which will

henceforth undoubtedly operate to check the decline in cattle numbers, and may be expected eventually to reverse it. But it must be remembered that the country's general stock of cattle cannot be materially increased from one year's end to another, as is practicable, for instance, in the case of hogs. That must be a matter of more than one year, or even two or three years; and in the meantime we have to deal with a stock of cattle which has lately been felt to be distinctly short in relation to the requirements of buyers.

The strongest reason for supposing that the deficiency of stock cattle tends to become more decidedly felt is certainly to be found in the state of the supply in Texas, taken in connection with the increasing difficulty of importation from Mexico. The great resources of Texas and the south-west generally have hitherto sufficed to make good a large proportion of the deficiency in other portions of the country. But the increasing demands made on the stock of southwestern cattle, together with the exhaustion of the range, have told heavily on the cattle numbers throughout this region. The strength of the herds has everywhere been greatly reduced; young stock cattle, which not long ago were forthcoming in unlimited numbers, are now short of the requirements of purchasers, and it is becoming increasingly difficult for northern cattlemen to obtain the supplies of southern cattle which they need. It may be noticed also that in the course of the last two years there have been some shipments of Texan cattle from New Orleans to England direct—about 2,000 head in 1897.

As regards the demand, it is thought that the recovery during the last two years does not represent the whole improvement which was to be expected; and the prospects of a stronger demand in the cattle market are encouraging.

The following table (taken from the British agricultural returns) gives the numbers of live cattle exported from the United States to Great Britain in the years 1894 to 1897 inclusive:—

	Year.	Number.
1894	- - - - -	381,932
1895	- - - - -	276,533
1896	- - - - -	393,119
1897	- - - - -	416,299

The export for 1895 was specially affected by the scarcity of corn, and may be left out of the comparison as the result of exceptional conditions; but taking the figures for 1894, 1896, 1897, there is an increase over the three-year period averaging some 11,000 head per year.

The exports of fresh (chilled) beef and of canned beef to the United Kingdom, for the years ending June 30, 1894 to 1897* inclusive, were, according to the United States returns, as follows:—

Year ending June 30.	Fresh Beef.		Canned Beef.	
	Lbs.		Lbs.	
1894 - - - -	193,331,292		42,544,532	
1895 - - - -	190,736,136		40,310,196	
1896 - - - -	224,507,040		40,092,098	
1897 - - - -	290,007,772		34,714,439	

It has been a noticeable feature of the export business that the price of American cattle and beef in the British markets during the year 1897 did not show as great an improvement as in the United States. The average value of fed steers in Chicago for the year 1897 is estimated, as has been seen, at about 1s. 10½d. per 100 lbs. (live weight) above the average for 1896. The prices of American imported fresh beef in the English market for these two years, according to the British returns, were: 37s. 10d. per cwt. in 1896, and 38s. 5d. in 1897; giving an addition per cwt. of only 7d. The improvement in price of British cattle was also less marked than that in the United States markets; the estimated average price in the London Metropolitan Market being 1s. 2d. per cwt. (dressed weight) higher in 1897 than in 1896.

The difference between the English and the American prices seem thus to have been scarcely large enough to afford a fair profit on exportation; and the year 1897 is described by the "Live Stock Report" as a busy, but not a very profitable one, for exporters. The cost of placing a steer bought in Chicago on the English market is estimated roundly at £5, with some variation from changes in ocean freights, and it is reckoned that, in the case of heavy weight cattle such as are exported, a difference of from 3d. to 3½d.

* The United States monthly trade returns show that for the year ending June 30 1893, the exports to the United Kingdom were: Fresh beef, 274,183,636 lbs.; canned beef, 20,763,131 lbs.

per lb. between the prices in the two markets is about sufficient, allowing for shrinkage in transit, to yield a reasonable profit to the exporter. Of the cattle shipped to England in 1897, about two-thirds were bought in Chicago, at prices ranging from 2d. to $2\frac{7}{10}$ d. per lb., largely from $2\frac{3}{10}$ d. to $2\frac{1}{2}$ d. per lb. The price of American cattle on the Deptford market ranged from $4\frac{1}{2}$ d. to $6\frac{1}{4}$ d.; but the top price seldom reached the latter figure, being more generally about 5d. to $5\frac{3}{4}$ d., so that the margin appears frequently to have fallen below the 3d. necessary, according to this estimate, to furnish a profit.

It may be inferred that exporters, to keep their hold on the English trade, have done some of their business at a sacrifice. It may be observed, besides, that the great firms which now control the export trade also do a large packing and dressed meat business in the United States, and can afford to conduct one branch of their trade for a time without return.

In the long run, however, the export can continue only if the difference between the prices on each side of the Atlantic gives a fair profit; and when the relative prices in the two countries are considered, the prospect for British farmers is not so disheartening as has been inferred from the increase of the American exportation. The export of cattle and beef to Great Britain has increased; but the price at which they can be profitably brought to the English consumer has not been lowered, and there is no prospect of it. The past few years have brought about a restriction in the American supply which tends for the present to strengthen American prices, and there has been a recovery, which still continues, in the demand. The former of these conditions is to be reckoned with for some time to come as the principal factor influencing the American market, though the increasing activity in the breeding business may be expected gradually to correct it. Looking somewhat further ahead, the fact principally to be noticed is that the cost of production of American cattle tends on the whole to increase, as compared with that of British. With the decline of ranching and the substitution of dearer methods of cattle-raising, the average cost of making beef in the United States has for some years

been on the increase ; and this process is now very noticeable in the south-western region, which is of peculiar importance as the source from which the country has in recent times drawn enormous supplies of cheap cattle. In parts of the west, where ranching has long since disappeared, the cost of cattle-raising also tends to increase slowly, as population becomes thicker, and pasture and hay become less abundant and dearer.

Mr. O'Beirne concludes that there is, therefore, no reason to anticipate that as time goes on the American stock-grower will find himself in a better position to undersell producers in the older country. On the contrary, the terms on which the two compete tend in the long run to become less unfavourable to the British farmer.

AGRICULTURAL AND MISCELLANEOUS NOTES.

CELERY AND PARSNIP FLY. (*Tephritis onopordinis*.)

Celery was very much injured throughout the season of 1898 by the attack of the fly known as *Tephritis onopordinis*.* Very soon after the plants had been pricked out spots were seen on the leaves, and light green maggots or larvæ were found within the parenchyma. Maggots were found actively working as late as the 27th, of November, and in many cases the plants were materially injured, and the blanched stalks small and badly shaped. The maggots caused much more harm than usual because the weather was very dry, and the leaves could not grow away from them. The great heat seemed to favour the generation of the insects.

Some good was effected in gardens by pinching the infected leaves so as to kill the maggots. An application of very finely powdered lime and soot, mixed in the proportion of one bushel of lime to two bushels of soot, was efficacious; and spraying with paraffin emulsion appeared beneficial. Dressing with nitrate of soda was also of some use, as it forced the leaf growth out of the way of the maggots. Agricultural salt was also of considerable value.

In many gardens and market gardens parsnips were almost as much infested as celery plants, but their foliage is usually stronger, and the leaves are far thicker and larger, so that their juices are not exhausted in the same degree, and the effect is not nearly so great upon the development of the roots. Many parsnip beds, however, had a most unsightly

* Copies of an illustrated leaflet on the Celery Fly may be obtained on application to the Secretary, Board of Agriculture, 4, Whitehall Place, London, S. W.

appearance, and the crop was more or less injured. Parsnips infested by this fly are far more difficult to treat than celery plants, especially if the crop is strong, but some good was caused by spraying and sprinkling with lime and soot by means of knapsack distributors.

It was noticed that a beautiful brilliant green ichneumon fly, evidently parasitic upon the *Tephritis onopordinis*, came from infested celery and parsnip leaves. Infested leaves were put in a glass-covered box, and many of these ichneumon flies were found later on, having come from the celery-fly pupæ, either upon the leaves or on the bottom of the box. At least twenty per cent. of the pupæ were thus parasitised and prevented from producing flies. This parasite is but little more than the twelfth of an inch long, with a wing expanse of barely one-fourth of an inch. It is of an emerald-green colour, with a very narrow body, having six yellowish legs and darker feet. It resembles the insect described by Curtis in his "Farm Insects" as *Pachylarthrus smaragdinus*. There is no doubt that it was doing excellent service in October, and until the first week of November, in celery and parsnip beds attacked by the celery and parsnip fly.

FRUIT TREE BEETLE IN ORNAMENTAL TREES.

Among the complaints of injury received from insects during the last three months was one of the destruction of a fine specimen of the ornamental flowering "Weeping Apple" (*Elise Rathke*) by some "grub." Upon examination, the branches and the slender stem were found to be full of the larvæ of the Fruit Tree Beetle (*Scolytus rugulosus*), the bark was peeling off, and the tree nearly dead. This tree had been obtained from a nurseryman in November, 1897; it put forth some flowers in the spring following, and appeared healthy until the summer, when it failed, and by the end of the autumn was past recovery. In November the owner of the garden was advised to take it up and burn it, in order to destroy the larvæ of this most dangerous insect, which

swarmed in all parts of it. There were other kinds of spring flowering trees in the same garden, such as *Pyrus floribunda*, *Pyrus rosea plena*, or "Double Crab," and *Pyrus japonica*; and it is greatly feared that some of these may be infested by beetles which left the "Weeping Apple" during the spring and early summer. There was a slight indication of the presence of the larvæ in a branch of *Pyrus japonica*; but this was cut away, and it is hoped that the infestation has not spread further. As this attack had never been noticed before in this garden, it is only reasonable to suppose that the insect was brought in the "Weeping Apple" tree in November, 1897. It must have been well established in the tree at that time, as it is almost impossible that it could have wrought such destruction in the course of one year, and this demonstrates the importance of examining trees, shrubs and plants carefully before they are planted.

The Fruit Tree Beetle was described in the Journal of the Board of Agriculture for March, 1898. It is very small—barely one-tenth of an inch long—black, with russet-coloured wing covers, legs, and antennæ. It comes from the galleries made in the wood towards the end of April, and flies to infest another tree, in which it bores a hole and places white eggs. Legless, much wrinkled, white larvæ, about one-tenth of an inch long when extended, with chestnut-coloured heads, soon come from these and feed upon the bark. There are at least two generations in the year, and the larvæ feed all the winter, pupation taking place in the early spring.

When trees are seen to be attacked, all branches showing signs of infestation must be cut away at once and burned. In case of bad attack it is better to cut the tree down, and burn every part of it during the winter, to prevent the egress and flight of the beetle in the spring.

POTATO EXPERIMENTS IN CHESHIRE.

The Board of Agriculture have received from the Cheshire County Council a report of experiments on potato cultivation, which have been carried out at the Agricultural and Horticultural School at Holmes Chapel during the past three

years. The growth of potatoes is a very important part of the agricultural work carried on in Cheshire, and hence special attention has been given to this subject. The objects in view were to test the productiveness, character, and yield of a number of varieties; to test the advantage of planting whole sets, cut sets, and sets of different sizes; and to try the effect of artificial manures when applied with farmyard manure.

A field of six acres was planted, the soil being a loam on which a crop of unmanured oats had been previously grown. The field had been in grass for at least eighty years, and there was, therefore, a considerable amount of old sod not decomposed when the potatoes were planted. Manures were applied in the drills, at the rate of 15 tons of farmyard manure, 3 cwt. of superphosphate (25 to 27 per cent. soluble), and 1 cwt. of sulphate of ammonia (98 per cent. purity) per acre in all cases, except in the special manure experiments. The following table shows the yield of the leading varieties in 1897 and 1898, but it may be observed that, though the plots varied in size, only the produce of one-twentieth of an acre was weighed in each case, the weights given in the table are the yields per acre calculated from the weights thus obtained.

Variety.	1898. Total Yield per Acre.			1897. Total Yield per Acre.		
	Tons.	c.	q.	Tons.	c.	q.
<i>Early Rounds—</i>						
Early Market Favourite - - -	14	0	1	11	13	3
<i>Early Kidneys—</i>						
Challenge - - - - -	17	1	3	14	7	1
<i>Second Earlies: Kidneys—</i>						
British Queen - - - - -	18	11	2	13	18	0
<i>Late Varieties—</i>						
Up-to-date - - - - -	21	3	2	17	13	3
Hough Giant - - - - -	20	4	1	16	7	3
County Councillor - - - - -	15	9	1	13	18	1
Hough Abundance - - - - -	14	1	2	12	0	3
Cheshire Delight - - - - -	13	13	2	10	10	3
Maincrop - - - - -	13	3	0	11	10	0

In the six trials of whole sets *versus* cut sets three cases show that whole sets gave the heavier yield in both total

quantity and quantity saleable; in the other three cut sets gave the best results, although the difference was only 43 lbs. per acre in one case, 111 lbs. in the second, and 772 lbs. in the third. There seems to be no great difference between planting whole sets and cut sets, provided that the cut sets are made thick and large; that two eyes or buds are left in the rose end of each set; and that the cut surface is dusted over with slaked lime. When very large sets are purchased it would, it appears, be more economical to cut the large sets in most cases. The cut sets produced fewer chats than whole sets, and larger saleable potatoes. In the case of different sizes of seed the experiments went to show that it is not profitable to plant small cut sets, as it was found that whole sets which passed through a $1\frac{1}{2}$ -inch riddle yielded 10 tons 13 cwt., whilst the same size sets cut in two only yielded a little over 8 tons, and sets that would not pass through a 2 or $2\frac{1}{2}$ inch riddle produced a heavier crop than sets which passed through a $1\frac{1}{2}$ or 2 inch riddle. On this question of the relative advantage of planting whole and cut sets, it may be interesting to compare the results of experiments in this direction in France, recorded in earlier numbers of this Journal.*

With regard to manures, a moderate dressing of farmyard manure by itself was found to produce a good crop of potatoes; but a judicious addition of artificial manures containing nitrogen, phosphoric acid, and potash, increased the yield, and showed a considerable profit over the cost of the artificial manures. The farmyard manure was valued at 6s. per ton, the saleable potatoes at £3 per ton, and the small at £1 per ton. The best results were obtained from 3 cwt. of superphosphate, 1 cwt. sulphate of ammonia, and 1 cwt. muriate of potash, along with 15 tons of farmyard manure. Sulphate of ammonia seems to be the best form in which to apply nitrogen to potatoes. The sulphate of ammonia plot produced 1 ton $5\frac{1}{2}$ cwt. more than the nitrate of soda plot, or in money value £3 10s. 5d. more per acre. Muriate of potash produced better results than either sulphate of potash or

* Vol. III., June, 1896, p. 70; and Sept., 1896, p. 176.

kainit, when used in conjunction with superphosphate, sulphate of ammonia, and farmyard manure. The application of 4 cwt. of kainit, along with 1 cwt. of sulphate of ammonia and 3 cwt. of superphosphate, gave a profit of 5s. 3d. per acre; by substituting 2 cwt. of sulphate of potash for the kainit, a profit of £5 9s. 3d. per acre was obtained; whilst 1 cwt. of muriate of potash, with the same quantity of sulphate of ammonia and superphosphate, gave a profit of £8 16s. 1d. per acre.

FLAX IN IRELAND.

The thirtieth annual report of the Flax Supply Association for the improvement of the culture of flax in Ireland gives the following information as to the results of the flax harvest of 1897.

The area under the flax crop of 1897 was the smallest on record. The earliest existing account of the acreage is that prepared by the Inspector of the Irish Linen Board, which commences with 1812 and covers a period of fourteen years. The smallest sowing in these years was 84,885 acres in 1813, and the average for the whole period amounted to 132,423 acres. After this there are apparently no statistics relating to flax in Ireland till 1847, when the first returns were collected by the Irish Constabulary, and during the half-century which has elapsed since that time the smallest area was in 1848, when there were only 53,863 acres under flax.

The difference between 1896 and 1897 is 26,677 acres, or a decrease in the latter year of 36·9 per cent. All the counties in Ulster contribute to this decrease, but in a different degree; in Donegal the decrease is only 2·6 per cent.; in Monaghan it is 56·4 per cent. In Donegal, flax occupies 2·9 per cent. of total land under crops, in Monaghan it is 2·7 per cent., and for the whole of Ulster the area under flax is 2·8 per cent. of the total area under all crops. The area outside Ulster was only 347 acres. Ten years ago the position of flax in Ulster was very different: the acreage under the crop then representing 7·30 per cent. of the total cultivated

area. In 1877 it was 6·62 per cent., but in 1867 it amounted to 12·7 per cent.

The yield per acre in 1897 (23·93 stones) is within a small fraction of that of 1896, which was 24 stones per statute acre. The average yields range from 15 stones in Fermanagh to almost 29 stones in Antrim.

The total production in 1897 was a little under 7,000 tons, *i.e.*, 4,000 tons, or 37·1 per cent. less than in 1896, as shown in the following table :—

Province.	Area under Flax.	Produce per Acre.	Total Produce.
	Acres.	Stones.	Tons.
Ulster - - - -	45,229	23·90	6,757
Munster - - - -	85	28·16	15
Leinster - - - -	67	28·10	12
Connaught - - -	195	28·03	34
Total - - - -	45,576	23·93	6,818

The yield of 6,818 tons was about one-fifth of the total required for the linen industry. Of the other four-fifths Russia supplied by far the largest quantity, but the supply of the medium and finer qualities came chiefly from Belgium and Holland. In this connection it is interesting to note that arrangements have been made for an experienced Belgian grower to reside near Ballymena, for the purpose of advising farmers as to the Belgian methods of preparing the land, etc., and the system of pulling, watering, drying, and scutching the flax. It is proposed also to obtain the services of a foreign expert in the Coleraine district.

AGRICULTURE IN NICARAGUA.

The Board of Agriculture have received from the Philadelphia Commercial Museum a pamphlet giving some information relating to the position of agriculture in the State of Nicaragua. It seems that the principal agricultural product of that country is coffee, which is extensively grown, as the Government encourages its cultivation by paying a premium

of 5 cents for each tree to planters having 5,000 or more plants in bearing in certain departments. A premium of 21 cents is also paid for each cacao tree, and of 10 cents for each rubber tree grown in the country. The production of indigo is said to be no longer profitable in Nicaragua, and in only a few places is this plant still cultivated.

With regard to cereals, beans, manioca, potatoes, rice, sugar, vegetables, and fruit, no reliable data were to be obtained, either as to the area devoted to them or as to the crops produced.

Cattle farming is largely pursued, and it is believed that there are 313,000 head of cattle and about 32,000 horses and mules in the country. There are a small number of goats and a few sheep. Swine, it appears, are seen everywhere, even in the streets of the cities. Immense quantities of poultry are raised both in the towns and in the rural districts.

In order to promote the improvement of live stock and the increase of vegetable products, the Government offers premiums for the introduction of high grade animals for breeding; and for the cultivation of wheat, sugar cane, tobacco, rice, beans, maize, potatoes, and pasture land.

Immigrants into the State are afforded special facilities for the acquisition of land. There is no tax on land, but in some of the departments a municipal income tax is imposed.

Agriculture in Nicaragua is stated to have been impeded hitherto by a lack of good roads and by the want of proper skill and knowledge on the part of the cultivators. Another difficulty is the condition of labour under the peonage system. In Mexico, Guatemala, and some other Central American States, after the suppression of the so-called "encomiendos," and of forced labour, and after the abolition of the costly African slavery, a kind of peonage was invented. In this system poor families were allowed to dwell on the estates of landowners for a rental payable only in labour. This mode of payment was extended afterwards to all debts for commodities advanced by the landowner or contracted in any other way. In Nicaragua the people have had complete liberty, but there is now an agricultural law

which practically establishes the peonage system just described, although the labourer is free to go where he likes and to work when he likes, provided he is out of debt.

DAIRY FACTORIES IN WISCONSIN.

In the summer of 1897, the Agricultural Experiment Station of Wisconsin undertook a special inquiry into the condition of the cheese and butter industry in that State, and the following information has been extracted from the report of the results of this inquiry. It was ascertained that the number of cheese factories and creameries in operation in Wisconsin in 1896 was 2,522, of which 1,571 were cheese factories and 951 were creameries. The investigation of 1897 was confined to 156 of these establishments.

It appears that the Wisconsin cheese factories are for the most part small and poorly equipped. Of 104 visited in connection with the inquiry it was found that 86 belonged to private owners, 10 were owned by co-operative societies of farmers, and in six cases the farmers owned the buildings and the operators the machinery. The total number of farmers supplying milk to the 104 factories was 2,837, and the average daily milk supply was 414 gallons for each factory, some of the smaller establishments receiving only from 100 to 200 gallons daily, while a few others dealt with as much as 700 to 900 gallons daily. The number of cows per factory was not ascertained in all cases, but for 66 factories in which these particulars were known the average was 236 cows. The average daily milk yield of the 15,571 cows supplying these 66 factories was 172 gallons per cow, the range being from under 1 gallon to 3 gallons per day. Fifty-six of the factories paid for the milk according to its fat contents, and the milk supplied gave an average fat contents of 3.61 per cent., while in 38 other cases in which the milk was tested, but not paid for according to its percentage of fat, the average fat contents were 3.54 per cent.

American cheddar is the principal variety of cheese made in the Wisconsin factories, but brick and Swiss cheeses are

also manufactured in a few establishments. The cheese is usually sold by the factories every week, and the dividends on the sales are in most cases paid monthly or fortnightly, so that the farmers get frequent cash returns. In the greater number of factories the price charged for the manufacture of the cheese is from $\frac{5}{8}$ d. to $\frac{3}{4}$ d. per lb. It is the usual practice to return the whey to the farmers, who give it to their pigs.

The methods of paying salesmen and secretaries of factories for their work vary considerably. In some cases the salaries consist of a small commission on the sales, in others, a fixed sum is paid per sale, per month, or per dividend declared. An ordinary payment to a secretary amounts to about 6s. 6d. per month. The cheese factories are, as a rule, closed for four months in the year.

With regard to the butter-making industry the inquiry extended to 52 creameries, of which 33 were owned by individuals, and 19 by co-operative societies. The number of farmers contributing to a creamery ranged from 15 to 145, the average being 40. The daily milk supply of these creameries amounted in six cases to between 100 and 200 gallons only, in 20 creameries the quantity dealt with daily was between 200 and 500 gallons; and in the remainder it usually ranged from 500 to 900 gallons, but in two cases it was 1,800 and 2,300 gallons respectively. The distances from which the creameries drew their supplies of milk varied from two to ten miles. All the creameries visited used separators, the belt separator being the system mostly employed, although a few turbine machines were also used. The Babcock test is used as the basis of the payments made to farmers for their milk, and the price charged by the creamery for making the butter is usually 2d. per lb. The separated milk is returned to the farmers.

Unless the butter maker owns the creamery he has nothing to do with the butter after he has packed it in tubs; he does not sell the butter, except small lots bought by farmers or incidental customers.

The number of men required to operate a creamery depends a great deal on the arrangement of the building and machinery, and the kind of packages in which the butter is

sold. Thirty-three of the Wisconsin creameries employed only one man, but in nearly every case they did not receive over 500 gallons of milk per day, there was no feed mill to run, no branch skimming stations which sent in cream daily to be churned at the central factory, and the butter was all packed in 20, 30, or 60 lb. tubs. When the amount of work is increased to a daily receipt of 600 gallons of milk or more, or in the case of inconveniently-arranged working rooms, printing, packing the butter into small packages, pasteurizing or bottling cream, the creamery generally employed two men.

The average wages of the creamery operators ranged in twenty-five instances from £6 17s. 6d. to £12 10s. per month, without board, and helpers were paid at the rate of £4 4s. to £7 6s. monthly, without board. A co-operative creamery receiving 2,300 gallons of milk daily, and packing all the butter into 60 lb. tubs (which were not weighed at the creamery), was operated by two men who received £14 12s. and £7 6s. per month respectively, without board. Another co-operative creamery, which received 800 gallons of milk daily, paid its butter maker £15 12s. 6d. per month, with free rent of rooms over the creamery, and supplied him with fuel, butter and milk. He was also expected to pay his helper when he needed one, the latter being usually paid £2 1s. 8d. per month and board. A similar arrangement was found at another creamery, except that the butter maker received £10 8s. 4d. per month, but he did not pay his helper, who received £5 4s. 2d. per month, without board.

LIVE STOCK IN NEW SOUTH WALES.

A report which has been lately published by the Department of Agriculture, New South Wales, contains interesting statistics relating to the number of farm animals enumerated in the colony on December 31, 1897.

The number of horses amounted to 466,813, or 17,215 less than in the previous year. The decrease is attributed to the

severe drought which prevailed over nearly the whole colony, to less breeding, consequent on low prices, and to the use of bicycles.

Of cattle there were 1,967,729 head, a decrease of 76,978 animals during the year. Shorthorns are by far the most numerous breed of cattle in New South Wales, numbering 690,000 head, compared with 210,000 Herefords, 70,000 Devons, and 35,000 Ayrshires. The remainder are cross-breds, and of these nearly 300,000 are of Shorthorn and Hereford blood.

The number of sheep enumerated was 43,952,897, showing a decrease of 4,365,893 compared with the previous year, and of nearly eighteen million compared with 1891, when there were nearly 62,000,000 sheep—the highest figure on record in the colony. The following table indicates the different breeds of sheep of which the flocks were composed :—

Breed.	Pure and Stud.	Ordinary.
	No.	No.
Merino—		
Combing - - -	5,744,282	23,267,523
Clothing - - -	1,775,566	9,278,565
Lincoln - - -	200,317	496,229
Border Leicester - - -	127,766	184,534
English Leicester - - -	38,390	92,333
Southdowns - - -	5,650	5,240
Shropshire - - -	12,459	12,109
Hampshire - - -	21	
Romney Marsh - - -	21,604	26,881
Crossbreds - - -	—	2,663,381

The total number of merino sheep exceeded forty million animals. The long-woolled sheep numbered nearly $1\frac{1}{4}$ million, and included forty-six Cotswold, one Cheviot, and one Dorset pure-bred rams, which are not shown in the above table. The cross-bred sheep were principally Lincoln and Merino crosses. During the year 136 stud rams and ewes were imported from America and Germany, and passed through the prescribed quarantine of sixty days in Sydney before being allowed to be removed inland. These animals, which were all Merinos, consisted of sixty-four rams and seventy-two ewes, of which forty-eight and forty-nine respectively were American and the remainder German sheep.

The total wool clip for the year 1897 was estimated at nearly 224,282,000lb., or over 30,000,000lb. less than in the previous year. The wool grown in the colony of New South Wales is shipped principally to England, America, France, Germany, and Japan.

The number of pigs in the colony was 207,738, being a decrease of 6,852 on the returns for the previous year.

DAIRYING IN HOLLAND.

The following particulars relating to the Dutch dairying industry have been summarised from a report by Herr Petersen to the German Agricultural Society, published in the *Milch Zeitung* of 15th October, 1898.

In the four years 1891-4 the imports of butter into Holland amounted on the average to about 40,000 cwts.; and the exports to 260,000 cwts. Of this total some 160,000 to 180,000 cwts. were annually shipped to England, and an average of 40,000 to 60,000 cwts. (in 1892-4) to Belgium; the export (chiefly of preserved butter) to the Dutch colonies also forming a not inconsiderable item.

For several years past the Dutch have paid great attention to improvement of the preparation and marketing of butter. Peasant proprietorship being almost everywhere the rule, co-operative dairies have in a comparatively short time attained great importance, and these associations are constantly extending. In the north, the dairies are generally large, but in the south there many small co-operative dairies; which, however, it would appear, are gradually being transformed into cream-stations, so as to allow of the concentration of butter-making in larger factories.

In some localities, with a view to making cheese, the cream, at least during certain periods of the year, is separated by the Schwartz process instead of by a centrifugal separator. The cream is often pasteurised. Artificial cultures are frequently used, and sometimes the large dairies themselves prepare the natural pure cultures. In large establishments suitable

cooling apparatus is frequently to be found to cool the water to the desired temperature.

The sale of butter by public auction, promoted by merchants' associations, has long been general in the towns throughout the country; but the supply is almost entirely peasant butter, as the dairy factories are able to find independent outlets for their produce. Formerly these auctions were of importance in the determination of official butter prices, but this is no longer the case.

At Maestricht there is an association, founded in 1895, for the sale by auction of butter for its members, who receive the proceeds weekly. In 1896 some 13,200 cwts. of butter were thus sold. Another type of association is the Guelder and Overysse Co-operative Butter Union, which, dating from 1896, comprises about sixteen dairies, and now handles the produce of some 8,000,000 gallons of milk in the course of the year. This association does not sell the produce for its members upon co-operative principles, but endeavours to put the individual dairies into direct business relations with foreign firms, particularly in England, with the aid of the Dutch Chamber of Commerce in London and of the Dutch consular agents. The butter is packed in fir tubs holding 112lbs. English, or in oaken tubs containing 44 to 88 lbs.; the prices are regulated according to the Copenhagen quotations. In Friesland there are several dairy companies. One such company, working five large factories, deals yearly with six or seven million gallons of milk; the butter goes to Amsterdam, made up in $\frac{1}{2}$, 1 or 2 pound packets, or else to England in 1 or 2 pound packets.

Of late years several dairy factories have preferred to pack their produce in cases containing 56lbs., to suit the English market.

The importance of the Dutch cheese industry is well known. In 1891-5 the imports of this commodity averaged nearly 5,000 cwts. a year, while the annual exports amounted to 620,000 cwts. This was distributed as follows:—Great Britain, about 270,000 cwts.; Belgium, 150,000 cwts.; Germany, 70,000 cwts.; France, 50,000 cwts.; while some 7,000 cwts. were shipped to the Dutch colonies and 5,000 cwts. to Denmark.

THE NUN MOTH.

A dispatch received through the Foreign Office from Sir Francis Pakenham in October last reported anxiety as prevailing in Sweden owing to the appearance in large quantities of a grub, which, insinuating itself under the bark of firs and pines, destroys the trees attacked with great rapidity. This pest, called in Swedish "nunna" (nun), is believed to have been originally imported from Germany, and from the description given it would appear to be identical with the "nun"-moth (*Liparis Monacha*), from which the forests of Germany and Central Europe have periodically suffered, although it has never been reported as causing serious damage in Great Britain. On the occasion of the widespread destruction effected in 1890 in the pine and fir woods of Bavaria, a short account of its ravages was issued by the Board of Agriculture.

As pine forests form the principal riches of Sweden and timber constitutes its chief staple export, the extensive development of the plague in that country is a source of serious danger. The remedy at present adopted has been the immediate destruction of each tree affected, with the decisive application of fire all round its vicinity—a process involving great present loss, but one which it is hoped may result in the extirpation of the scourge.

AGRICULTURE AND LIVE STOCK IN QUEENSLAND.

In the year 1897, according to the Report of the Registrar-General for Queensland, the total area under cultivation in the colony was 386,259 acres, being 49,484 acres, or 14.69 per cent. more than in 1896. More than half of this increase is accounted for by the extended area under wheat, there being 66,099 acres under this cereal, an increase of 27,157 acres; but about 8,000 acres of this were not cut for grain. The yield from the remainder was 1,009,293 bushels, equivalent to $17\frac{1}{2}$ bushels per acre. The return per acre obtained in Queensland was only exceeded in one Australasian colony, viz.,

New Zealand, which averaged nearly 23 bushels. Wheat cultivation is, however, at present practically confined to the southern portion of the colony to the west of the Great Dividing Range.

The production of wheat was not nearly sufficient for the home requirements, and wheat was imported to the extent of 360,419 bushels in 1897, and 863,469 bushels in 1896; there were also 31,700 and 32,996 tons of flour imported in these two years; thus the total importation of flour and grain is estimated to have been equivalent to 2,315,293 bushels of wheat in 1896, and to 1,755,219 bushels in 1897. The home produce therefore constituted 21 per cent. of the total supply in 1896, and 37 per cent. in 1897.

The only other cultivated cereal of importance is maize, of which there were 109,721 acres sown in 1897, with a yield of 2,803,172 bushels. The exports of this grain are inconsiderable. The production of oats amounted to 31,496 bushels, and the total consumption to 119,223 bushels.

The area under sugar-cane was 98,641 acres in 1897, but the produce of 65,432 acres only was crushed.

The following table shows the number of live stock in the colony in 1896 and 1897:—

	1896.	1897.
Horses - - - -	452,207	479,280
Cattle - - - -	6,507,377	6,089,013
Sheep - - - -	19,593,696	17,797,883
Pigs - - - -	97,434	110,855

As will be seen, the decrease in the number of cattle amounted to over 400,000; this loss was due to excessively dry weather throughout the south-westerly and westerly portions of the colony. Loss was also caused by tick-fever in the more easterly districts, but the mortality from this cause was not nearly so severe as that resulting from drought in the dry regions. Notwithstanding decreases in the number of cattle during the past three years, there were 1,615,297 more cattle in the colony in 1897 than ten years previously. The number of cattle exported alive was 176,329, whilst 259,363 were slaughtered and exported, either in the form of frozen or preserved beef, extract, etc., or of tallow and hides. The number of cattle imported is very small, but during the past two years larger imports of stud

cattle have been introduced to replace those lost by drought. During the five years 1888-92 an annual average of 3,424 head were imported and 240,000 exported, whilst in the five years 1893-97 the imports were 7,641 and the exports 169,818 per annum.

With regard to sheep, amongst which drought also caused heavy losses during the past year, the imports in the first five years of the decade averaged 317,631, and in the second period 190,129 per annum, whilst the exports averaged 393,438 and 751,323 head respectively. The number of sheep sent out of the colony alive in 1897 was larger than in any previous year, being 1,114,270 head; and it is estimated that the exports of dead meat and tallow represented 946,000 sheep. The most important pastoral product is, however, wool, of which 76,360,239 lbs., valued at £2,509,342, were exported in 1897; this commodity ranking next to gold in value of exports.

Hides and skins form the principal item in the other pastoral products, although no portion of a beast that can be in any way utilised is allowed to go to waste. In connection with the sheep-walks of the colony, the gradual reduction in the average number of sheep to each holding may be noticed. This average exceeded 21,000 in 1890, and last year had fallen to under 10,000.

Whilst the live stock in Queensland, proportionately to the area, is small, compared with the population it is very large. Thus there are 9.11 cattle and 26.62 sheep per square mile; but to each 100 of the population there are 1,256 cattle and 3,672 sheep. There is, it is stated, ample room for expansion in the number of live stock before the grazing capacities of the natural pastures are fully taxed.

CEREAL PRODUCTION OF RUSSIA.

A recent number of the *Bulletin Russe* contained a series of tables, issued by the Statistical Committee of the Russian Ministry of the Interior, showing for the sixty governments of

European Russia the net production, after deducting the quantity required for seed, of wheat, rye, and oats in each of the past twenty-seven years. The net figures are given in quinquennial averages in the table below :—

Years.	Wheat.	Rye.	Oats.
	Qrs.	Qrs.	Qrs.
1870-74	17,882,000	57,936,000	42,788,000
1875-79	15,931,000	55,302,000	43,619,000
1880-84	22,558,000	57,320,000	49,817,000
1885-89	22,368,000	68,962,000	48,235,000
1890-94	28,216,000	68,683,000	50,733,000
1895-97 (3 yrs.)	29,634,000	66,747,000	51,153,000

The quantity of grain used for seed, according to the tables issued by the Committee, varied from one-third to one-seventh of the gross crop.

[*Bulletin Russe de Statistique Financière*, April-June, 1898.]

ANALYSES OF IMPORTED DAIRY PRODUCE.

Dr. T. E. Thorpe, Principal Chemist of the Government Laboratory, in reporting upon the work performed in his department on behalf of the Board of Agriculture during the years ending 31st March, 1897 and 1898,* gives the results of the examination of samples of imported butter taken at the ports of entry by the Customs authorities during this period. The arrangement under which such samples are taken was sanctioned by the Treasury, at the request of the Board of Agriculture, in May, 1895; and the particulars for the period prior to 31st March, 1896, which have been already made public, are here added to those now detailed by the Principal Chemist, so as to present in a succinct form the results obtained from the commencement. The following table accordingly shows the total number of samples analysed, and the number found adulterated, between May, 1895, and

* Parliamentary Papers C. 9034 and 9035, price 1½d. each.

March, 1898, the countries whence the butter was imported being distinguished :—

Country.	1895-96 (May to March).		1896-97.		1897-98.	
	Samples Examined.	Found Adulterated.	Samples Examined.	Found Adulterated.	Samples Examined.	Found Adulterated.
Holland - - -	257	67	349	11	231	1
Den mark - - -	202	8	89	—	108	—
Germany - - -	171	43	172	32	144	20
Norway and Sweden -	119	2	113	2	137	—
France - - -	65	—	56	—	138	—
Belgium - - -	18	—	18	—	5	—
Russia - - -	47	5	46	1	57	4
United States - - -	65	—	54	—	179	—
Canada - - -	39	—	33	—	187	—
Australia - - -	57	—	16	—	37	—
New Zealand - - -	21	—	8	—	22	—
Argentine Republic -	5	—	6	—	26	—
Italy - - -	—	—	2	—	—	—
Spain - - -	—	—	1	—	—	—
Total -	1,066	125	963	46	1,271	25

In addition to the number of samples found adulterated, 42 samples in 1896-7 and 11 in 1897-8 were “of doubtful purity.” Most of these “doubtful” samples showed the presence of small quantities of vegetable oils, but at the same time gave analytical results corresponding with those given by genuine butter.

The use of preservatives other than salt was found to be very common in the case of butter received from certain countries, the usual substances employed being boric acid and borax. A preservative was almost always found in the samples of French butters, and very frequently in Dutch, and also in butters from distant countries such as Australia, New Zealand, and South America.

In order to obtain trustworthy information as to the character of the margarine imported from the continent, the Board of Customs in 1896-7 sent 101 samples of margarine and “mixtures” to the Government Laboratory. The amount of butter-fat in the mixtures was in most cases under 10 per cent., and never exceeded 20 per cent. In the following year

95 samples of margarine were received, Holland being in both years the chief source of origin.

In December last the attention of the British Government was drawn to the importation into this country of milk from Normandy, with the object of supplying the London market. At the instance of the Board of Agriculture, samples of this milk were taken by the Customs officers at Southampton, and sent to the Laboratory for examination, when the six samples received proved, with one exception, to be genuine and of good quality. All, however, were found to contain a considerable quantity of formalin, a well-known preservative.

The Principal Chemist has also carried out analyses of butter made in connection with certain feeding experiments in this country and abroad to ascertain whether, and to what extent, the substance, which gives the characteristic reaction for certain vegetable oils, occurs in the butter from the milk of cows fed upon oil cakes. Dr. Werenskiöld, Chemist to the Norwegian Government, lately instituted a series of feeding trials at the Agricultural High School at Aas, Norway, with the object of determining whether the cottonseed oil reaction is given by the butter from cows fed upon cottonseed cake. Fifteen samples sent by him to London were examined by Dr. Thorpe, with the result that the butter was found to be affected when cottonseed cake was used. The results of the English experiment, carried out at the South-Eastern Agricultural College, Wye, at the request of the Board of Agriculture, were given in the last number of this Journal (p. 205). They showed, briefly, that in the case of cottonseed oil some portion of the reacting substance passes through the lacteal glands of the cow and appears in the butter, whereas in the case of sesame oil no such transference of the characteristic substance has been so far detected with certainty.

A series of experiments was made also upon certain butter-colouring matters which contain vegetable oils as their medium. The vegetable oils used were found to be linseed, rapeseed, cottonseed, and sesame, but the amount of oil required to impart the necessary colour was so small as to be only just perceptible in the finished butter, and not likely,

therefore, to interfere with the assessment of the amount of vegetable oils in ordinary butter.

The bearing of these experiments upon the detection of the adulteration of butter with margarine, which is usually made up with vegetable oils, is not only of importance in connection with the examination of imported butters, but also as regards analytical work under the Sale of Food and Drugs Acts.

ADULTERATION OF BUTTER AND MILK.

The report of the Local Government Board for 1897-98 contains particulars of the results of the analyses of samples of food and drugs undertaken by Local Authorities in 1897, under the powers conferred on them by the Sale of Food and Drugs Act, 1875. Among other articles, 8,164 samples of butter, or what was sold as butter, were analysed, and 841 or 10·3 per cent. were condemned. A large number of samples of margarine were also taken, and in most of the cases the article had been sold contrary to the provisions of the Margarine Act, 1887. The analyst for one London parish reported that 60 per cent. of the margarine samples analysed by him in 1897 were unlabelled. A few samples of butter were condemned on account of an excess of water, and some of the samples on account of the unacknowledged addition of boric acid. In many cases the quantity of acid added was very small, but one sample in Glamorganshire was stated to contain as much as 112 grains per lb., or 7 grains per oz.

In different parts of the country the percentage of adulterated samples of butter varied considerably. In London, the rate was 14·4, in the thirty-two great towns it was 16·9, and in the rest of the country taken together it was as low as 6·7 per cent. The number of samples of butter submitted to the analysts by private purchasers was 320, and of these as many as 175 or 54·7 per cent. were condemned. This number included 262 samples taken by a special inspector of the Royal Lancashire Agricultural Society under an arrangement by which the analyses are made by the County Analyst free of

charge to the Society. Of these 262 samples, 144 or 55 per cent. were found adulterated.

Legal proceedings were taken in respect of 705 samples, and 619 fines were inflicted, amounting in all to £1,155 os. 6d. There were two fines of £20 each, one of £15, one of £12, thirteen of £10, four between £5 and £10, and fifty-one of £5. The remaining 547 fines averaged £1 4s. 10d. each.

Milk was the subject of analysis in 18,896 cases, of which 1,967, or 10·4 per cent., were condemned, as compared with 11·1 per cent. in 1896. This is the lowest percentage of milk adulteration recorded by the Local Government Board. Most of the improvement shown last year was in the metropolis, where the proportion condemned fell from 17·7 per cent. in 1896 to 14·6 per cent. in 1897. Five years ago, 22½ per cent. of the samples submitted for analysis in London were classed as adulterated.

Nineteen of the thirty-two great towns included in the Registrar-General's weekly returns had, in 1897, a lower rate of milk adulteration than London, and in several of them the rate was under 3 per cent. Thus, in Manchester, only twenty-six samples out of 1,114 were condemned; in Cardiff, eleven out of 409; in Preston, all the forty-three samples taken were genuine; in Oldham, three samples out of 150 were condemned; in Leicester, three out of 126; and in Gateshead, one out of 37.

In some instances the public are stated to have been defrauded by the sale, as skim milk, of milk from which practically all the fatty matter so necessary to nutrition, had been removed by means of a separator. It appeared from the evidence reported in one case that 93 and 95 per cent. respectively of the original fat had been removed from the two samples of milk examined.

Some analysts recognising the difficulty of distinguishing between adulterated milk and milk that is genuine but very poor, have caused analyses to be made of samples taken direct from the cows. The result has not always been satisfactory. By far the richest portion of the milk is that which is last yielded by the cow, and if the inspector is supplied with the first quart that is drawn it will probably

be found to be deficient in fat. The natural yield of the cow can thus be made to appear much poorer than it in fact is. It is stated in the report that in some experiments made on behalf of the Corporation of Oldham it was found that the difference in the amount of fat caused by keeping what is known as the "afterings" apart from the "fore" milk was sometimes as much as 12 per cent.

Legal proceedings were taken against the vendors of 1,193 samples of milk out of 1,967 samples condemned by the analysts, and in 981 cases penalties were imposed, amounting to £1,611 12s. 11d. There were sixty-three fines of £5 each, five between £5 and £10, nineteen of £10, one of £15, and two of £20. The remaining 891 fines included 132 of 5s. and under, twenty-two being of 1s., and one of 6d.

The following statement shows the number of samples of butter and milk examined, and the number found adulterated, under the provisions of the Sale and Food and Drugs Act, during the past ten years :—

Years.	BUTTER.			MILK.		
	Samples Examined.	Samples Adulterated.	Percentage of Samples Adulterated.	Samples Examined.	Samples Adulterated.	Percentage of Samples Adulterated.
	No.	No.	Per cent.	No.	No.	Per cent.
1888 -	3,499	363	10'4	10,859	1,292	11'9
1889 -	2,679	345	12'9	11,610	1,534	13'2
1890 -	2,743	316	11'5	11,967	1,530	12'8
1891 -	3,558	551	15'5	12,151	1,633	13'4
1892 -	4,743	725	15'3	13,633	1,818	13'3
1893 -	5,784	794	13'7	15,543	2,310	14'9
1894 -	6,419	667	10'4	16,305	1,868	11'5
1895 -	7,186	590	8'2	18,307	2,030	11'1
1896 -	8,256	725	8'8	18,795	2,091	11'1
1897 -	8,164	841	10'3	18,896	1,967	10'4

IRISH MIGRATORY LABOURERS.

The numbers of Irish migratory labourers who left the Province of Connaught for harvest work in England in 1897

and 1898 have been published in the *Labour Gazette*. The figures are based on returns made by the railway and shipping companies, and are stated to be more complete than on previous occasions, as the necessary particulars have now been obtained from all the railway companies concerned. The total number of labourers booked this year by rail and sea was 27,866, compared with 25,962 in 1897, 75 per cent. of whom came from the County of Mayo.

From inquiries made in all parts of the country it is learnt that the men from the West of Ireland generally go to the Northern and Midland counties of England, but a good many young women go from Mayo by sea to Scotland. Very few of the men who travel to England go further south than North Cambridgeshire. Those from Mayo, and also from Galway, Roscommon, Sligo, Leitrim, and Cavan chiefly go to Lancashire, Durham, Yorkshire, Cheshire, Derbyshire, Staffordshire, Warwickshire, Lincolnshire, and North Cambridgeshire. Some also go to a few districts in the counties of Cumberland, Nottingham, Shropshire, Rutland, Leicestershire, Northampton, and Herts. A very few are said to be sometimes found in parts of Worcestershire, Beds, Bucks, Surrey, and Sussex. In former years it is said that they came in considerably larger numbers into some of these counties, and reports from Berks, Oxford, Hunts, Kent, and Hereford, state that they used to come there, but have now ceased to do so, chiefly owing to the introduction of machinery at harvest, and also owing to the smaller acreage of grain crops grown. It is not uncommon to find men going to several counties. For instance, a number go to Derbyshire for temporary employment before the corn is ripe in Lincolnshire and Yorkshire. Others will get two harvests by going further north when they have completed one in a more southern county.

Some of the men start as early as February, take part in the ordinary work on farms, and do not return until the late autumn; but the majority do not go until June. They find employment during the summer and autumn at hoeing, hay-making, harvesting, and taking-up potatoes and roots, and on dairy farms in parts of Cheshire they undertake milking.

When engaged upon ordinary farm work, such as thinning turnips and potato lifting, they are frequently employed at piece-work, and in parts of Lincolnshire, Cambridgeshire, and Warwickshire they undertake harvest at piece-work. But in the Northern counties they are generally paid by the week or month, and in some districts they are hired at hiring fairs held specially for harvest hands. In the Northern counties, in addition to cash wages they are generally found sleeping accommodation in a barn, but find their own food. Not infrequently, however, their employers give them fuel, milk, and porridge, and in some cases they are found all their food. It is customary in some districts for Irish migratory labourers to work on the same farms year after year.

Nearly all the other migratory labourers come from the Province of Ulster, and most of these come from Donegal. They chiefly go by steamer to Northumberland or Scotland. A few start for Scotland early in the year. Some, both men and women, arrive in time for the potato planting in Ayrshire, the Lothians, and a few other places where potatoes are largely grown, but the majority do not go until the summer, some starting in July for turnip-thinning, haymaking, and lifting early potatoes, while many start in August for harvest. Some remain for potato-lifting, chiefly in the great potato-growing districts of the Lothians, and the counties of Forfar and Perth. A few men stay still longer for storing turnips.

The counties in Scotland in which both Irish men and women are employed are Ayr, Wigtown, Lanark, Midlothian, East Lothian, and West Lothian, Forfar, Perth, and the eastern Border Counties of Berwick, Roxburgh, Peebles, and Selkirk. They are most largely employed in the counties of Midlothian, East Lothian, and West Lothian, where a large extent of land is devoted to corn growing. Next to the Lothians they are most largely employed at harvest near Glasgow and in the eastern Border Counties.

In the county of Ayr, where large quantities of early potatoes are grown, a considerable number of Irish men and women are employed in the months of June, July, and August, lifting them. They are employed in large companies by the dealers, who purchase the growing

potatoes in the ground. The dealers often communicate with a man in Ireland whom the labourers call a "gaffer," who collects and takes a gang of young women over for this work. The "gaffer" accompanies them from farm to farm, and makes all the necessary arrangements as to travelling, etc.

It is stated that in recent years the introduction of the self-binder at harvest has greatly decreased the employment of Irish hands at harvest.

HARVEST WAGES IN 1898.

In the *Labour Gazette* for October the agricultural correspondent to the Labour Department of the Board of Trade furnished a statement of the harvest wages of agricultural labourers in 1898, based on returns received from 120 farmers in the Midland, Home, and Southern and South-Western Counties. The average cash earnings, exclusive of perquisites, of 2,032 labourers in a period of twenty-six working days were estimated at £5 19s. 3½d., compared with £6 2s. 2d. in the case of 1,670 men in these districts in 1897. In addition to cash payments, beer is given in a good many cases, and sometimes light refreshments, such as tea, bread, butter, and cheese. Overtime is also sometimes paid for. In Norfolk and Suffolk 1s. is often given for hiring money, and also "horkey" money—i.e., 2s. or 2s. 6d. for a supper at the end of harvest.

In some districts the rate of wages was rather higher this year than in 1897, but in these cases the work frequently took longer as the crops were unusually heavy, and often so beaten down that they had to be cut by hand instead of by machines. Some employers stated that they were delayed by the difficulty of getting sufficient hands. In cases where men are paid by piecework they, of course, earn more where higher prices are paid, but in districts where a bargain is made for the whole of the harvest work, or where no extra wages are paid, except, perhaps, a small bonus or extra food and drink, a protracted and arduous harvest is a disadvantage to them. As regards the state of the weather during the two

harvests, it was fine in both years in the Eastern, Home, and Southern and South-Western counties, though in parts of the Midlands in 1897 the fine weather broke up before harvest was completed, and consequently delayed it there.

In the great corn-growing counties of Cambridgeshire, Essex, Norfolk, Suffolk, and Lincolnshire, harvest wages were generally rather higher than last year. In Norfolk and Suffolk they usually varied from £6 10s. to £7 10s., exclusive of any beer given or of other extras. In fifteen parishes in the Giltcross Union in Norfolk the wages agreed upon for the harvest were between £7 and £7 10s., and in five between £6 10s. and £7. The highest wages appear to have been paid in the Fen districts of Cambridgeshire, Lincolnshire, and Norfolk, where the work is usually done by piecework, and where the crops were abnormally heavy and very much laid. A report from the Cambridgeshire portion of the Peterborough Union gives the average earnings of seven men carting for seventeen days as 9s. a day, and of three men with binders and reapers as £2 a week each. A well-known employer in the Wisbech Union writes that his head carters earned £6 11s. 11d. each in ten and a-half days, and that one of them took an additional £7 10s. for cutting, etc., in the three preceding weeks.

The system of payment at harvest varies considerably in different parts of the country. In the northern counties, where the majority of the men are hired by the year or half-year, the hired men are paid no extra harvest wages, but are frequently supplied with extra food and drink; the married men attached to the staff of a farm are, however, usually paid extra money wages, and often given food and drink. Extra hands, both English and Irish, get from £4 to £6 a month, frequently with an allowance of food and drink. Irishmen are usually given accommodation in barns. In other parts of the country the systems of payment are to give piecework; to contract for a certain sum for the harvest; to give the ordinary weekly wages, and, in addition, a bonus at the end of harvest; to pay double the weekly wages during harvest; to give extra wages for a month certain, and then to pay the ordinary weekly wages.

AGRICULTURAL RATES ACT, 1896.

This Act requires the Local Government Board to issue certain certificates of the annual grant to be paid to the Local Taxation Account in respect of the deficiency in rates caused by the Act, and as to the annual share of such grant to be paid to each spending authority.

The Report of the Local Government Board for the year 1897-8 (C. 8,978) states that, in consequence of the variations and amendments in the certificates as to the shares of spending authorities, the total amount of the annual grant under the Act as certified in a provisional certificate, dated March 27th, 1897, viz., £1,331,033 19s., was slightly less than was required, and the Board accordingly, after issuing a further provisional certificate, issued a certificate (dated March 31st, 1898), in which the amount of the annual grant under the Act is certified to be £1,333,116 1s. 8d.

The payments to the several spending authorities of the instalments of the grant in respect of the deficiencies arising from the provisions of the Act in the produce of rates in the half-years ended September 30th, 1897, and March 31st, 1898, respectively, were made either just before the commencement of, or early in, those half-years, except in cases where there were delays in consequence of alterations of area or authority.

In pursuance of Orders of the House of Commons, the Local Government Board have prepared, in connection with the Agricultural Rates Act, four returns, which have been printed as Parliamentary Papers of the session of 1897. The third Return* showed the following total rateable value of property liable to be rated to the poor rate in England and Wales:—

Agricultural land as defined by the Agricultural Rates Act	£24,565,058
Buildings and other hereditaments not being agricultural land	140,847,208
Total	£165,412,266

The statements from which the return was compiled indi-

* H.C. 368 of 1897.

cate the rateable value of the unions and parishes on July 20th, 1896. Statements were not received under the Act from the unions and parishes under separate boards of guardians which contained no agricultural land as defined by the Act, and the rateable values of those unions and parishes were taken from statements which show their rateable values at the beginning of the financial year 1896-7.

A fourth return (No. 379 of 1897) showed the gross estimated rentals of the above-mentioned classes of property to be as follows:—

Agricultural land as defined by the Agricultural Rates Act	£26,881,783
Buildings and other hereditaments not being agricultural land	172,347,123
Total	£199,228,906

The rateable value of agricultural land was in 1897 rather more than one-seventh of the total rateable value of England and Wales; the rateable value of agricultural land averaged about $91\frac{1}{2}$ per cent. of its gross estimated rental, and the corresponding percentage in the case of buildings and other hereditaments not being agricultural land was $81\frac{3}{4}$.

IMPORTS OF ONIONS INTO THE UNITED KINGDOM.

For many years the imports of onions into the United Kingdom have, with few fluctuations, shown a progressive increase, and during the past decade the quantities entered annually have risen uninterruptedly from 3,485,000 bushels in 1888 to 6,109,000 bushels in 1897. The imported supply is made up of consignments of varying dimensions from a number of countries, but the greater share of the trade is confined to Spain, Holland, and Egypt. In the past year the quantity of Spanish onions received amounted to 1,754,000 bushels, of the value of £248,000, or 2s. 10d. per bushel. Holland furnished 1,741,000 bushels, valued at £170,000, or 2s. per bushel; and to Egypt we were indebted for 1,162,000 bushels, declared to be worth £175,000, or 3s. per

bushel. The value of the total imports of 1897 was £760,560, or 2s. 6d. per bushel.

A relatively small proportion of the onions imported is re-exported, the quantity shipped in this way in recent years having been between 300,000 and 400,000 bushels annually. The United States is the principal consignee in this trade.

AGRICULTURAL CREDIT ASSOCIATIONS IN BRITISH COLUMBIA.

A law has recently been passed in British Columbia providing for the establishment of agricultural credit associations in that country. Associations incorporated under the new Act are to be managed according to regulations prescribed by the Lieutenant-Governor in Council. The number of members of any association is unlimited, but no member can hold more than 150 shares, which must not exceed a face value of 10 dols. (41s. 8d.) each. The amount of premium, by way of membership fee or otherwise, is to be not less than 5 dols., to be charged upon the issue of shares, and the amount of calls to be levied *pro rata* upon the shares of the association for the cost of management must be provided by the rules of the association. All premiums collected by the associations must from time to time be deposited in the provincial treasury to the credit of the association in an account to be opened and kept by the Minister of Finance and Agriculture, and known as the Agricultural Credits Associations' Guaranty Fund, on such terms as to interest and otherwise as the Lieutenant-Governor in Council may appoint. The Lieutenant-Governor may guarantee the payment of the debentures of any association, or, pending the issue of debentures, may advance money to the association upon such terms as he may think fit. In the event of the winding-up of any association, the reserve fund, after payment of the liabilities of the association, must be deposited in the treasury of the province, to form part of the Agricultural Credit Associations' Guaranty Fund, and shall be applicable towards payment of any loss that the Government may have incurred.

The associations are authorised to raise money by loans or debentures, bearing not more than 6 per cent. interest, to an amount not exceeding two-thirds of their share capital, and to receive money on deposit from members. Loans are to be made to members for the purpose of draining, clearing, or cultivating the lands held by them, for fencing or buildings, or for the purchase of live stock, implements, and other farming effects, and to assist in co-operative dairying and farming. No dividend can be paid on the shares, but all profits and earnings are to be placed to the reserve fund.

The supreme authority in an agricultural credit association is to be vested in the general meeting of members, at which every member has a right to attend and vote on all questions, but no member can exercise more than one vote whatever may be his interest in the association. The current business is to be entrusted to a committee of management consisting of five members elected annually; and in addition a council of control may be elected consisting of at least six members. The members of the committee and council will receive no remuneration for their services. A secretary and also a treasurer may be appointed by the committee, or the same person may discharge both offices, and may, with the approval of the general meeting, draw a salary as treasurer. A member having in the opinion of the association committed any action calculated to injure the association may be expelled by resolution of a general meeting of the members.

All property, both real and personal, acquired on behalf of a credit association, is vested in the association, which may contract and sue as a corporation.

[*U.S. Consular Reports, July and Sept., 1898.*]

FRENCH FORESTRY.

The French Forest Régime was instituted in the year 1825, and since the year 1840, which, so far as statistics show, may be taken as the period when the area of the woods was at its lowest figure, increasing attention to their maintenance

and extension has been given by successive administrations. In 1840, the woods and forests covered an area equal to 16.61 per cent. of the total surface of the country. In 1892, they covered 18.03 per cent. This gain of 1.42 per cent. represents an addition to the forest area of France during this period of 1,772,000 acres, or from 21,747,000 acres to 23,519,000 acres; but these figures are not really comparable, since the total area of France has been altered by the acquisition, in 1860, of Savoy and Nice, and by the loss in 1871 of Alsace-Lorraine. The gain since the previous decennial inquiry of 1882 is, however, 0.15 per cent., representing an area of about 164,000 acres.

Comparing the area under forests with the agricultural, instead of the total, surface of France, it amounts to 18.87 per cent. of the agricultural land; and, as regards proprietorship, is thus distributed:—

(1) State woods	..	..	..	2.16	per cent.
(2) Woods belonging to Departments, Communes, and Public Institutions	..	..	..	4.39	„ „
(3) Woods belonging to private proprietors	..	..	..	12.32	„ „

18.87

The State woods are, of course, subject to strict forest régime; those belonging to local authorities and public institutions are only in part so subjected, while the woods of the private proprietors are managed according to the will of their owners. The effect of these different methods of treatment may be briefly summarised thus:—

The woods of the private proprietors, who generally hesitate to engage a considerable capital on their estates, are grown chiefly with a view to the immediate returns obtainable from their underwood when sold at the stage of growth suitable for firewood. The woods belonging to the communes are worked less exhaustively, but still usually with the desire—if not the necessity—of obtaining a yearly revenue. The woods of the State are, on the other hand, jealously regarded as capital investment, and are adminis-

tered with a view to permanent improvement, the actual revenue derived from them being limited, during the first twenty-five years at least, to the value of the thinnings.

In spite of the tracts, estimated at 18 per cent. of the entire State forests, still in their initial unproductive stage or incapable of yielding any return, the annual yield of wood is nevertheless 35·75 cubic feet per acre of State forests, just exceeding the 35·32 cubic feet from the same area of departmental and other public forests, although these latter have only about 3 per cent. of such young plantations. The yield from the private forests is, however, somewhat greater, amounting to 44·7 cubic feet. In these valuations no deduction has been made for the areas which are still in the unproductive stage, or for those which, from the nature of the ground, or for any temporary reason, etc., are incapable of yielding any return. If account is taken of the produce from profitable areas only, the excess of the yield in the State woods over the departmental and communal woods is more marked, and the value per acre still more so. No return has been made of the unproductive area of private woods, and, although the annual money value of the yield per acre of private woods considerably exceeds that from the State woods (calculated on their total area), and is about double that from the departmental woods, it would appear that the areas of State forest actually in full yield give a return per acre of higher value than that from the productive areas of private woods.

Although an increase in the forest area of France has been recorded during the decade 1882-92, this gain is nevertheless wholly in the area administered by the Government; the woods in the hands of the departments, etc., and of private owners, both showing a slight decline. The augmentation of the State woods is to be chiefly attributed to purchases on the part of the Government for re-afforestation in mountainous districts; increases in these woods during the decade being noted particularly in the Alps and Pyrenees. The progress of the State woods during the decade also appears from the fact that there were, in 1892, 484,000 acres of "recent woods," as against 64,000 acres of similar land in 1882: much

of the "coppice under conversion" has also during the period given place to "mixture of coppice and tall trees." Woods not under the administration of the Government also show transformation of coppice into forest, but not to the same extent, proportionally, as the State woods.

Forestry has not escaped the general depression of prices which has affected all products during the last twenty years; and timber is estimated by the French Ministry of Agriculture to have depreciated in value by about 14 per cent. during the decade 1882-92. Consequently, in spite of the increased acreage of the area under forests, their total annual revenue, as calculated at these two dates shows a total diminution from £13,373,000 to £11,580,000, *i.e.*, by £1,793,000, or 13·4 per cent.

HEMP CULTIVATION IN EUROPE.

The United States Department of Agriculture has recently issued a report on the cultivation of hemp in Europe, with a view to acquaint American hemp growers with the foreign practices by which high grade hems are produced. The publication contains interesting information relating to the history of the plant, and a detailed account of the methods of cultivation adopted in France and Italy, where the best hemp is produced.

The native home of hemp, known botanically as *Cannabis sativa*, is India and Persia; but the plant is now in general cultivation in temperate and tropical climes throughout the world. Hemp grows throughout India, ascending the Himalayas even to a height of 10,000 feet. It has long been cultivated in China and Japan. It flourishes in tropical Africa on both the east and west coasts, and is found to some extent in the interior. It has been naturalised in portions of Australia, and thrives in several South American countries, while in North America it can be grown from the Gulf of Mexico to Canada, and from the Atlantic to the Pacific.

In Europe the culture is confined chiefly to France, Italy, Germany, Hungary, and central and southern Russia, but it also grows in Holland and Belgium, and it has been cultivated in parts of Great Britain and in Sweden. In Italy its growth is largely confined at the present time to the provinces of Bologna and Ferrara; in France, to the province of Brittany; while the chief hemp-producing districts of Russia are Orel, Kursk, and Smolensk, and the Polish provinces. The plains of Hungary are also said to be peculiarly adapted to the cultivation of hemp.

Five varieties of hemp are cultivated in Europe, viz., the common hemp, which is grown largely in France and in Europe generally (excepting Italy), attaining a height of 5 ft. to 6 ft.; Bologna hemp, known in France as Piedmontese hemp, or "great hemp," an Italian variety, averaging 12 ft. in height; Chinese hemp, known in Europe since 1846; the *Cannapa piccola*, or small hemp of Italy, which has a reddish stalk, and is found in the valley of the Arno and around Tuscany; and the Arabian hemp, known as *Takrousi*, a short species cultivated for its resinous principle, from which hasheesh is derived.

French hemp and Italian hemp are somewhat similar in colour—a creamy yellow, and they are soft and fine in quality. The Russian and American hems are for the most part dark in colour, and are said to be not so fine in quality.

The principal departments of France where hemp is cultivated are Maine-et-Loire, Sarthe, Morbihan, Isère, and Puy-de-Dôme. The two varieties cultivated are the common hemp of the country and the Italian hemp, the seed of which is obtained from Piedmont; the chief difference consisting in the length of the stalk of the latter variety, its slower development, and its coarser quality, which makes it better adapted for cordage. Climate has much influence on the successful cultivation of this plant, as the best length of stalk, and consequently the greatest yield of fibre, are obtained in those situations where the climate is mild and the atmosphere humid.

In the cultivation of hemp in France a rotation of crops

is practised, hemp alternating with grain crops, although it is also allowed to grow continually upon the same land ; deep ploughing and the annual use of an abundance of fertilisers keeping the ground sufficiently enriched for the demands which are made upon it. If the soil is not sufficiently rich in phosphates or potassium salts, these are supplied by the use of lime, marl, ground bone, animal charcoal, or ashes mixed with prepared animal compost. Even hemp-cake, the leaves of the plant, and the " shive " or " boon " are returned to the land with benefit.

In Italy, the cultivation of hemp is one of the most important agricultural pursuits of the provinces of Bologna and Ferrara, where the industry has greatly developed owing to the favourable conditions of the climate and soil. Bologna hemp is generally manufactured into yarns for canvas and twines ; the Ferrara hemp is principally worked up by rope spinners. The former has a softer and brighter, but less strong, fibre than the latter, but both kinds are held in high esteem in textile centres. It appears that the diversity of quality in hemp for yarns and canvas and that for rope does not arise from the difference in the plants, but from the results of vegetation, culture, steeping, and general manipulation. The same hemp bed will produce, in its central portion, a good, long, resisting fibre, while from the sides of the same bed a short, hard fibre, fit only for the rope spinner may be obtained.

The aim of the grower is to obtain slender and erect stems, which are produced by thick sowings, so that the plants may reciprocally shade each other and thus yield a soft, silky, bright, and strong fibre. The seed sparingly sown produces thick stems, especially at the root end of the plant, and yields 15 per cent. less fibre than thickly-sown seed. Isolated or wild plants do not thrive on poor and badly-tilled soil. On the other hand the plants may reach a height of 20 feet in a deep rich and well-prepared loam, but such stems are rough, thick, and branchy, producing coarse and barky fibre which is fit only for the manufacture of rope.

SWEDISH MARGARINE REGULATIONS.

A royal decree has lately been issued regulating the manufacture of margarine, margarine-cheese, and artificial fats in Sweden, and the trade in these products. The regulations imposed by this decree will come into force on 1st April, 1899. They are almost identical with the provisions of the royal decree of October 11th, 1887, which, however, applied to margarine only, whereas the new measure controls also the sale of margarine cheese and artificial edible fats.

Margarine and margarine-cheese, within the meaning of the new regulations, are defined as any substances resembling butter and margarine cheese, respectively, which contain fat not derived from milk; while artificial fats (for human consumption) are those which contain fat other than swine-fat. The regulations do not apply to unadulterated fats of animals or plants sold under a designation clearly indicating their origin; nor to margarine, etc., when made solely for the use of the maker's own household.

No margarine or margarine-cheese may be made on premises where butter or cheese is prepared for sale, packed or stored for export, nor may any fats used for margarine be kept there. Exceptional permission, in the case of the manufacture of margarine-cheese in connection with a dairy on a large scale, may be granted by the King, on application being made, for a definite period, or until withdrawal of the permission; provided the manufacturer conforms to these regulations or any other which the King may require in each particular case.

Any person desirous of manufacturing margarine, margarine-cheese, or artificial edible fat, must notify the Governor of the district. The factory is to be placed under the inspection of a person appointed by the Governor, whose duty it shall be to see that only good and wholesome materials are used and produced, according to such directions as the medical authorities may issue. The inspector is also to see that the regulations are properly carried out. He is to have access at all times to the whole of the premises where the goods are made and stored, and is bound to respect trade secrets. He is to receive a salary, paid by the manufacturer

to the Governor, the amount of which is to be determined by the Governor of the district according to the size of the factory and other circumstances, but which shall not be less than 100 kronor (£5 11s.), or more than 300 kronor (£16 13s.) per month. If the manufacturer allows this salary to fall into arrear, the Governor is empowered to suspend the factory until the arrears are paid. If the inspector resides more than two kilometres ($1\frac{1}{4}$ miles) from the factory he can also claim travelling expenses.

Margarine and artificial fats must be packed in vessels which are either square or of such an oval form that the length is at least half as much again as the breadth. The words "margarine" or "artificial fats," as the case may be, must clearly be branded or otherwise durably imprinted on the base, top, and sides of the receptacle, in letters at least 3 cm. ($1\frac{1}{8}$ inches) high, together with the name of the manufacturer, or, if the article is foreign, of the importer. In the retail trade the goods may be exposed for sale in smaller quantities, cut into shapes, but must have a clearly visible label with the proper designation. Margarine-cheese must have the word "margarine-cheese" impressed upon the flat surfaces in letters at least 3 mm. ($\frac{1}{8}$ inch) high, as well as the name of the dairy where it was produced, and the exterior must also be coloured with Orleans red, or some other non-poisonous dark red colour.

The above regulations concerning packing, colouring, etc., apply equally to imported goods and to goods destined for export.

When being sold, if such goods are not delivered in vessels of the prescribed form, they must be delivered in a wrapper bearing in clear type the words "margarine," etc.

Shops, market booths, vehicles, etc., where such goods are on sale, must also have a clearly visible notice indicating the fact, and in all commercial papers such goods must be specified under their proper designation.

Imported goods, declared at the custom-house to be margarine, etc., if not packed according to the regulations, cannot be removed from the custom-house until they are so shaped and packed. If goods imported, or exported, not declared to

be margarine, etc., are nevertheless suspected of being such, or if the requirements of these regulations are not satisfied, the customs officers are at once to notify the provincial government. The latter, in the case of suspected goods, will cause a sample to be taken for examination, but not before the payment of the duty of the goods in the custom-house. The cost of analysis will be paid by the State, unless the goods are found to be adulterated, in which event it will fall upon the owners.

Contraventions of the regulations concerning manufacture and import are punishable by a fine of 100 to 1,000 kr. (£5 11s.—£55 11s.), and the goods are to be confiscated. Contraventions of the regulations concerning export are punishable by a fine of 200 to 2,000 kr. (£11 2s.—£111 2s.), or by imprisonment.

NEW YORK COLLEGE OF FORESTRY.

The New York State College of Forestry was established by an Act of the State Legislature in April, 1898, authorising the trustees of Cornell University "to create and establish a department in the said University to be known as, and called, the New York State College of Forestry, for the purpose of education and instruction in the principles and practices of scientific forestry." In the same Act provision was also made for the establishment of a demonstration forest of not more than 30,000 acres in the Adirondacks, to be purchased out of the funds set aside for the Forest Preserve Board. The forest is to become the property of Cornell University for the term of thirty years, and is to be used for demonstrations of practical forestry. By the same Act the Commission of Fisheries, Game, and Forests is ordered to furnish the necessary guards and to protect the property. The sum of £2,080 has been appropriated for the organisation and maintenance of the College and demonstration forest.

The object of the College is to furnish instruction in the principles and practice of forestry, and to provide facilities

for the education of managers of forest properties. An attempt will also be made, so far as the means placed at the disposal of the College permit, to provide for more elementary instruction, which is desirable for rangers, wood-workers, and others, who in their occupations can profit from such knowledge. The instruction thus proposed may be given in short summer or winter courses at other points than Cornell University, or at the College forest establishment itself. There will also be provided in the College shorter courses to meet the needs of other classes of students, who as a matter of general education wish to have a cursory acquaintance with the various aspects of the subject, and those who, as prospective owners of woodlands or farmers, desire some technical, especially silvicultural, knowledge.

It may be observed that the art of forestry is as yet hardly practised in the United States, but it is believed that within a few years the call for professional foresters will be comparatively large. The Government has reserved some thirty million acres of the public timberland as forest reservations, and an administration of the same has been ordered which sooner or later will require professional advice. There is a Division of Forestry attached to the Department of Agriculture, but this has acted hitherto mainly as a bureau of investigation and information on forestry matters not requiring the services of professional foresters.

OSIER CULTURE IN THE UNITED STATES.

The Forestry Division of the United States Department of Agriculture has recently published a report on the cultivation of osier willows in that country, where immense areas of unutilised land along many rivers, portions of the sea-coast, and of some uplands and prairies not suitable for any other agricultural pursuit, are said to invite capital and energy to invest in osier growing, chiefly for the manufacture of basket-ware.

According to the census of 1880 there were in the United States 304 willow-ware establishments with a capital of

£386,000, engaging 3,119 persons, paying annually the sum of £136,960 for wages, and producing manufactured willow goods to the amount of £415,000. The value of the material consumed in the industry was £180,600, of which, however, only a small portion represented home produce. In 1890 there were 403 willow-ware establishments in the country, with a capital of £563,000, engaging 3,732 persons, paying annually the sum of £264,400 for wages, and producing £757,000 worth of manufactured ware. The value of material consumed was £291,350, or an increase of 61 per cent. over that used in 1880.

The imports in 1880 of manufactured willow-ware as reported by the United States Treasury Department, amounted in value to £29,628, and of osier or willow prepared for basket-makers' use to £4,550. In 1890 the value of the importations of manufactured willow-ware had risen to £77,600, and of prepared osier or willow to £5,760, an increase of 27 per cent. since 1880.

Assuming that manufacturers include some other items under the head of material consumed besides prepared osier, the census increase of 61 per cent. is probably a fair estimate of the increase in the amount of osier used in 1890 over that used in 1880. The imports of prepared willow increased from 1880 to 1890 by only 27 per cent.

The fine willow-ware used in the United States is largely imported. The labour conditions are not suited to the industry, except in certain localities, such as Syracuse, N.Y., where the manufacture of salt is carried on largely in the summer, employing a great number of men who would be out of employment in winter unless they had basket-making to fall back upon. Very few basket makers work all the year round at their trade, and for this reason it is held that many farmers in the prairie States could engage in osier willow work during the winter season with considerable advantage.

MAIZE PRODUCTS OF THE UNITED STATES.

Maize or Indian corn is the most important crop cultivated in the United States. The average area devoted to the crop

annually in the ten years ended 1897 was about 75 million acres, and the average production for the same decade was 1,845,000,000 bushels; the average export of maize and maize meal during that period was 72,960,000 bushels, or about 4 per cent. of the production. A bulletin recently issued by the United States Department of Agriculture gives some account of the various uses to which the maize plant is devoted, in addition to the employment of the grain for human food and for cattle.

Throughout the United States maize is a popular article of food, and among parts of the population of the Southern States this cereal is the principal bread food used. It is also eaten largely in various other forms, as hasty pudding (mush) and other preparations. But though maize enters largely into the dietary of the people, its principal use is as fodder for live stock, while it is also employed in various manufactures.

The blades of the maize stalks have been used from earliest times for feeding farm animals in the United States; and a portion of the stalks has also been used for similar purposes. In some localities maize stover (*i.e.*, stalk offals) almost excludes other forms of coarse food, such as timothy hay, clover, etc. This fodder is often fed in the coarse state without any preparation whatever, but in this condition a very large percentage of it is wasted, the cattle eating little except the blades, and perhaps some of the smaller and more tender parts of the stalk. In the older parts of the country it is becoming general to have the fodder finely shredded. This not only increases the quantity which becomes available for food, but also leaves the manure in a much better condition for spreading on the ground. The cobs of Indian corn have high nutritive values, but are used mostly for fuel and not for cattle feeding. In the past few years they have, however, been employed in some States for the latter purpose, after having been ground to a fine meal.

It has already been stated that maize is used to a great extent in various manufactures. An industry in the United States which absorbs large quantities is the manufacture of starch, practically all the starch of commerce being

derived exclusively from the grains of Indian corn, though a small quantity is made in a few localities from the potato, and, in Florida and some parts of the south, from the cassava. Maize is also largely employed in the American glucose factories. It is estimated that about 40,000,000 bushels of the cereal in question are consumed annually in the production of starch sugars, an industry which has assumed large dimensions in the United States. These products of the hydrolysis of starch are known as glucose and grape sugar. The glucoses represent those in which the hydrolysis is less complete, and consist largely of dextrine, dextrose, a little maltose, and water. These are made into syrups which are used largely for table syrups, for adulterating molasses and honey, and for confectioners' purposes. Grape sugar is a term applied to the solid product obtained by the hydrolysis of starch when the process is carried to a greater extent, the resulting product consisting chiefly of dextrose.

Maize whisky is another product of this useful cereal. It is believed that more whisky is made from maize in the United States than from all other grains combined. It is generally designated by the term "Bourbon," to distinguish it from rye whisky. The process of manufacture is analogous to that used in making the spirit from other cereal grains; the conversion of the starch into fermentable sugars being accomplished by diastatic action, and the resulting mash fermented and subjected to distillation. Maize is also practically the source of all the commercial alcohols, Cologne spirits, and other alcoholic products made in the United States, the distillation of these products consuming annually about 15,000,000 bushels.

Among other minor uses to which the maize plant is devoted it may be observed that the pith of the stalks is employed in the construction of battleships. Compressed blocks of maize pith are placed between two armour plates, and by their resiliency they completely close up any hole made by a projectile, thus preventing the entrance of water for a considerable time. The maize germ, too, yields a valuable oil, which has been used to some extent as salad oil, for lubricating purposes, and for lamps. Finally, the glutinous

and other residues from the manufacture of starch, glucose, whisky, and alcohol, are used for feeding cattle. Formerly it was the custom to employ these waste matters in the moist state, but in most parts of the country this practice has been superseded by the method of drying the residues and selling them in the practically anhydrous condition. In this form they are much more easily transported, the objectionable odours which were a predominant characteristic of the moist food are removed, and its wholesomeness is promoted. The method of preparing these foods is practically the same as that used in the saving of residues from breweries for feeding purposes, and the nutritive value of the Indian corn residues is said to be quite equal to that of brewers' grains.

INTERNATIONAL POULTRY EXHIBITION AT ST. PETERSBURG.

In the September number of this Journal particulars were given of the regulations issued by the committee of the International Poultry Exhibition to be held at St. Petersburg from the 13th to the 28th May, 1899. The Board have now received a copy of the instructions for judging the exhibits, of which the following are the principal points:— Domestic birds will be judged according to the standard of the country from which they are sent, but birds with physical defects or not corresponding to the standard will not be judged. The highest prizes are only to be awarded to pens consisting of one male and two female birds; pens of one male and one female bird cannot receive any higher prize than a small gold medal, nor single specimens a higher prize than a large silver medal. In judging cross-bred birds, the points which will be taken into consideration are size, strength, and fattening qualities. Pigeons will be examined and judged according to existing standards, and carrier pigeons may be subjected to a trial. First prizes, such as gold medals, etc., will only be awarded to poultry breeders, inventors of incubators and other apparatus for poultry-keeping, and to authors of works of ornithological literature.

A bulletin has been issued by the Agricultural Experiment Station of Utah giving the results of an experiment which was carried out with the view of testing the comparative number of eggs yielded by fowls of different ages with and without exercise. The fowls selected for the experiment were all brown Leghorns from the same poultry yard, and consisted of hens from three to four years old, early-hatched pullets about seven months old, and late-hatched pullets about five and a half months old. Eight fowls of each kind were employed, four of which were placed in small pens, while the other four were allowed exercise. The result of the experiments showed that in all cases the number of eggs laid in the course of a year was higher when the fowls were allowed exercise; and the pullets were, in each case, much more productive than the hens. The early-hatched pullets without exercise laid 158 eggs each, and with exercise 182 eggs each; the late-hatched pullets laid 137 eggs without exercise, against 151 eggs with exercise; whilst the penned hens laid 64 eggs, against 107 from the hens allowed to run free.

The Bavarian Agricultural Council, in view of the persistently low prices of hops, and the consequent depression among growers, lately urged the Bavarian Ministry of the Interior to appoint a committee, to inquire into the best means of coping with the critical condition of this crop, in order, by appropriate treatment of hops during the period of growth, as also of the product put on the market, to secure a better output and prices to correspond. The Ministry of the Interior acceded to this request, and the committee, which included hop producers, hop merchants, and brewing experts, made various proposals, among which the erection of suitable hop-drying apparatus was urged as one of the most important.*

* *Jahres-Bericht des Bayerischen Landwirtschafts-Rathes*, 1897.

In a report recently issued by the Forestry Division of the United States Department of Agriculture, it is stated that one of the districts in Germany in which osier willow culture and the basket-making industry have made most rapid progress is situated in the valleys of the Wurm and the Roer near the borders of Holland. Twenty-five years ago there were not more than 70 acres of osier willows in the district; now all the large pasture lands are intersected by these plantations. The entire area planted amounted in the year 1882 to 1,393 acres; at present it is estimated at about 1,640 acres. Twenty-five years ago there were but very few basket-makers in the district; now there are 952. A willow-weaving school, which was established in 1876, with the object of producing thoroughly capable workmen in this department of industry, has already done excellent work, and promises still better results. The prosperity of the district is reported to have been greatly increased by the introduction of this new industry. Basket-making in Germany is a considerable industry, employing nearly 40,000 persons annually, representing nearly £625,000 capital, and using the growth of over 48,000 acres of willows, valued at £396,000 on the stocks, or nearly double that amount when peeled. When it is considered that the soil devoted to osiers is generally ill-adapted for agricultural purposes, and consequently of little marketable value, these figures represent an unusually high rent.

The egg trade is assuming considerable proportions in Russia. In 1897 29,842 tons were exported from Riga. This means that something like 430,000,000 eggs were shipped to Western Europe during the year, the bulk of them finding their way to the United Kingdom and Germany. And it seems more than probable that the trade will grow still larger in view of the increased facilities for conveyance which the railways and certain steamship companies are bringing into operation.

Russian Eggs.

The exports from Libau amounted to over 80 million eggs, or 23 million more than in 1896. Of the total number $53\frac{1}{2}$ millions were sent to England.

[*Foreign Office Report, Annual Series, No. 2, 185. Price 2d.*]

According to the *Ugeskrift for Landmænd*, the production of margarine in Denmark in the year ended March 31 last amounted to 26,180,000 lbs. The average annual production in the five preceding years was 18,480,000 lbs., but in 1889-90, the first year in which returns of home manufacture were collected, the quantity produced was only 6,600,000 lbs. In spite of this great increase in the output from Danish factories the imports of margarine have not declined. The net importation of the product into Denmark in 1897-98 was 5,280,000 lbs., and this, added to the native production, made the total quantity of margarine available for consumption 31,460,000 lbs., or nearly 13 lbs. per head of the population.

According to the official returns of the Registrar-General of Queensland there were 164 butter and cheese factories in operation in the colony in the year 1897. Nearly 11,000,000 gallons of milk were manipulated in these establishments, which employed 658 hands in regular work. The output of factory-made butter was 3,478,000 lbs., out of an estimated total production in the colony of 5,686,000 lbs., and of cheese the factories are stated to have manufactured 1,897,000 lbs., out of a total production of 2,291,000 lbs.

A great impetus is stated to have been given to the sugar industry in Queensland by the passing of the “Sugar Works Guarantee Acts, 1893 to 1895.” The original measure passed in 1893 provides that the Government may, on the application of an incorporated company, guarantee its debentures with interest at $3\frac{1}{2}$ per cent., the proceeds to be devoted to the erection of works for the extraction of sugar—taking as a protection against loss a mortgage over the works and over freehold land in the vicinity. This measure has been largely utilised, and has opened to the sugar industry important areas of land that would have remained for a long time unemployed for sugar cultivation had the means for manufacturing been dependent on unaided private enterprise. The area under cane in the Colony in 1897 was 98,641 acres, compared with 83,093 acres in the previous year; of this total 31,426 acres were defined as “newly-planted” or “stand over cane,” and sugar was crushed from the remainder only. The total yield was 97,916 tons, of which 62,418 tons were exported.

[*Report for 1897 of the Registrar-General for Queensland.*]

The development in the cheese trade of Canada which, so far as the exports show, has been continuous up to the present time, is well illustrated by the increase which has taken place in the number of cheese factories. In the year 1871 there were in the dominion 353 of these establishments; in 1881 there were 709; by the end of the next decade the number had risen to 1,565; and in the year 1897 it was believed to be 2,556, exclusive of 203 factories which produced both butter and cheese. The quantity of cheese sent out of the country in 1897 was 1,466,000 cwts., which was about the same as in the preceding year, when the export was higher than had been previously recorded. Practically the whole of this export came to Great Britain, only about 2,500 cwts. being sent to other countries. With regard to creameries, the increase

Dairy Factories in Canada.

has been equally marked, the numbers being 46 in 1881, 170 in 1891, and 559 in 1897. The exports of butter have fluctuated considerably; in 1880 the amount sent out of the country was 165,500 cwts.; in the subsequent ten years there was a great decline, the export in 1890 being only 17,400 cwts., but in 1897 102,000 cwts. were exported.

Information has been received through the Foreign Office that the vintage in Marsala has this year

Marsala Wine. proved unsatisfactory, owing to want of rain, and damage by the scirocco. It is stated also that the phylloxera has appeared in the district since the beginning of last year, and has made rapid progress, so that the Marsala wine trade is seriously threatened. American vines are being largely planted, and small quantities of these are being supplied by the Government free of charge, in the hope of forming nursery stocks for a future supply of cuttings. A society has also been formed with the object of encouraging the culture of American vines, and of studying the soil and other conditions so as to ascertain which varieties are best suited to the district.

Information has been received through the Colonial Office that an Act has been passed in Tasmania

Tasmanian Vegetation Diseases Act. to prevent introduction of diseases, insects, fungi, and other pests affecting vegetation. The Act prohibits the importation into Tasmania of any insect or fungus, except for scientific purposes, and with the consent of the Minister of Agriculture. The Governor is empowered to forbid, by proclamation, the importation of plants likely to introduce diseases of vegetation.

The Board have received information through the Foreign Office that a law has been passed in

Importation of Plants into Bulgaria. Bulgaria prohibiting the introduction of vines and parts thereof from countries infected with phylloxera (but permitting the importation of other plants), and authorising the Bulgarian Government to join the International Phylloxera Convention.

REPORTS ON FOREIGN CROPS.

CROPS IN THE UNITED STATES.

The yield of maize in the United States, according to the report of the United States Department of Agriculture, of November 1st, was estimated at 24·8 bushels per acre. The acreage under this crop had been returned in July at about 97 per cent. of that in 1897, which would indicate a total area of about 77,692,000 acres, so that the total production of this cereal works out to something like 1,927 million bushels.

The yield of barley was returned as 21·6 bushels per acre, which, upon the 2,575,000 acres estimated to have been sown with this cereal, would give a total production of about 55,620,000 bushels. The yield of 27·8 bushels of oats per acre corresponds to a total of 703,868,000 bushels, the area being about 25,319,000 acres.

Of other crops, the area under potatoes appears to be about 2,568,000 acres, and the average yield of this tuber amounted to 75·2 bushels per acre, equivalent to a total production of 193,000,000 bushels. The area under hay was estimated at about 42,766,000 acres, the production at 1·55 tons per acre, the highest on record (the ten-year mean being 1·23 tons) : the total amounting thus to nearly 66,300,000 tons, which is stated to be the largest crop ever gathered. The apple reports continue to show a decline in condition.

The usual final estimates of wheat (of which the area, as mentioned in a previous number of this Journal, was put at about 43 million acres) had not, at the time of going to press, yet been issued, being withheld pending further information.

CROPS IN RUSSIA.

The Board have received from Mr. Michell, Her Majesty's Consul-General at St. Petersburg, a despatch furnishing particulars of the preliminary estimates of the yield of cereal crops this year in Russia. These estimates, which are published by the Ministry of Agriculture, relate to the results of the harvest in European Russia, Poland, and the Northern Caucasus. The following are the estimated yields of the principal grain crops in these divisions of the Empire, converted into imperial quarters :—

Crop.	European Russia (50 Govern- ments).	Poland (10 Govern- ments).	Northern Caucasus (3 Govern- ments).	Total for 63 Govern- ments.
	<i>Qrs.</i>	<i>Qrs.</i>	<i>Qrs.</i>	<i>Qrs.</i>
Rye - - -	77,933,700	8,312,250	736,125	86,982,075
Winter wheat - -	10,206,600	3,083,625	3,874,125	17,164,350
Spring wheat - -	32,171,850	23,025	1,231,125	33,426,000
Oats - - -	63,829,000	6,377,654	1,446,346	71,653,500
Barley - - -	34,054,110	2,483,100	2,275,650	38,812,860

Mr. Michell states that the above figures can only be taken as an approximation, and that they are based on the supposition that the area of cultivation was the same as in 1897. It appears that a failure, either complete or partial, of the harvest of all grain, both autumn and spring sown, occurred over a large area of country embracing the provinces of Kazan, Samara, Viatka, Simbirsk, Ufa, the greater part of the provinces of Saratoff, Orenburg, Nijni-Novgorod, the eastern districts of the province of Penza, the western and south-western portions of Perm, and the northern circuits of the Don country. The failure of spring-sown grain was more marked than that of autumn-sown crops, and occurred particularly in the mid-Volga provinces, in that of Samara, and in those bordering on the Ural, as also in the provinces of Tamboff, Riazan, Tula, Vladimir, Kostroma, and some districts of Vologda.

For purposes of comparison it may be observed that, according to the preliminary estimate published by the Ministry of Agriculture, the yield of the principal crops of

1897 in the 63 governments referred to above were as follows: Rye, 69,855,790 qrs.; wheat, winter and spring, 35,294,717 qrs.; oats, 58,563,019 qrs.; barley, 25,605,601 qrs.

The later official estimate issued by the Central Statistical Committee of the Ministry of Finance gave the results of the harvest of 1897 in the same 63 governments as follows: Rye, 72,741,680 qrs.; wheat, winter and spring, 35,669,240 qrs.; oats, 60,896,830 qrs.; barley, 27,567,690 qrs.

CROPS IN ARGENTINA.

According to the reports published in *La Agricultura*, up to the middle of November last, the approaching harvest in Argentina is expected to furnish a good crop of wheat, and the yield is likely to exceed that of last year in the provinces where this grain is chiefly grown. Locusts had made their appearance here and there, but there were few complaints of injury from these insects. In some districts the crops had been injured by hail storms, but the damage from this cause was apparently confined to a comparatively limited area. In Santa Fé the wheat fields were reported in November to present an excellent appearance, and to promise an exceptional crop both as regards quality and quantity; in the province of Cordoba, where some anxiety had been experienced on account of drought, timely rains had fallen, and wheat was in excellent condition; in Entre Rios a better yield was expected than that secured in 1897-98, and in Buenos Ayres there were prospects of an abundant wheat harvest.

THE FRENCH HARVEST OF 1898.

The estimates of the yield of the cereal crops issued by the French Ministry of Agriculture showed the wheat harvest of 1898 to be the largest recorded since 1874, and more than fifteen million quarters over that of last year. In the following table the production of the current year is com-

pared with the average crop of the past five years, and it will be seen that the cereal harvest appears to be generally above the average.

CROP.	AREA.		PRODUCTION.	
	1898.	1893-97.	1898.	1893-97.
	Acres.	Acres.	Quarters.	Quarters.
Wheat - -	16,951,000	17,053,000	45,049,000	37,597,000
Rye- - -	3,689,000	3,740,000	8,829,000	7,942,000
Barley - -	2,089,000	2,158,000	6,319,000	5,299,000
Oats - - -	9,690,000	9,682,000	36,227,000	28,980,000

CROPS IN GERMANY.

The preliminary official estimates of the German harvest of 1898, based upon trial threshings throughout the Empire, indicate that all the crops have been above the average of the last five years. In the case of winter wheat the yield was returned as $27\frac{1}{2}$ bushels per acre, or two bushels more than the mean. In Saxony, where the yield appears on the whole to have been highest, 39 bushels per acre were reported. Spring wheat is put at 23·8 bushels, or about $2\frac{1}{2}$ bushels more than usual. The yield of winter rye was estimated at 22·7 bushels per acre, which is nearly two bushels above the average of the last five years; the yield is heaviest in Saxony and Hesse. With regard to barley, the yield for the whole empire was 30·8 bushels per acre, or three bushels higher than in 1897. Saxony gave an average of 37·8, and Hesse of 39 bushels per acre. Of oats, a yield of 38·6 bushels is indicated; Saxony reporting as much as 51·4 bushels, while the Hessian return is nearly as high.

Potatoes show an average yield of 94·8 cwts. to the acre, about 5 cwts. more than usual, the heaviest returns again coming from Saxony (121·6 cwts.), while the lowest yields are reported from the south-west. Clover and lucerne, as well as meadow hay, also appear above the average, the latter being estimated at 34·8 cwts. per acre, while clover and

lucerne together are put at 42·9. In the case of these crops, the more southern districts, and as far north as Saxony, report better yields than Prussia, the highest returns of all coming from Baden.

The above data, based upon trial threshings of the new grain, are compared with similar data for previous years. The final returns of the German harvest of 1897, recently issued, show the area and production of the principal crops last year to have been as follows (the mean yield of the ten years 1887-96 being added for comparison) :—

Crop.	Area. 1897.	Yield 1897.		Average Yield per Acre 1887-96.
		Total Yield.	Yield Per Acre.	
	<i>Acres.</i>	<i>Qrs.</i>	<i>Bushels.</i>	<i>Bushels.</i>
Wheat - - -	4,744,000	13,353,000	22·5	21·2
Rye - - -	14,738,000	31,774,000	17·2	16·0
Barley - - -	4,115,000	12,331,000	24·0	23·9
Oats - - -	9,878,000	34,138,000	27·6	27·2
		<i>Tons.</i>	<i>Cwts.</i>	<i>Cwts.</i>
Potatoes - - -	7,577,000	29,269,000	77·2	71·2
Fodder Beets - -	1,150,000	10,454,000	181·9	151·1
Sugar Beets - -	1,093,000	12,412,000	227·1	—
Clover - - -	4,405,000	6,863,000	31·2	23·7
Lucerne - - -	533,000	1,121,000	42·1	23·7
Meadow Hay - -	14,603,000	20,833,000	28·6	33·6

CROPS IN AUSTRIA.

The October report of the Austrian Ministry of Agriculture states that the corn harvest generally had given very satisfactory results in that country; only in the case of barley was the yield occasionally small, while the quality of this grain was not always good. Maize was hardly up to the average. Sugar-beets were mostly very small, so that only a middling yield was expected, but the sugar-contents were very satisfactory.

CROPS IN ITALY.

The Italian Ministry of Agriculture has issued a preliminary estimate of the yield of the wheat and maize harvest

in 1898, together with the comparative figures for the two preceding years. According to this preliminary statement the yield is put at 16,156,000 quarters, which is slightly above the average; in 1897 the yield was only 10,529,000 quarters, but in the preceding year it amounted to 17,593,000 quarters. No estimate of acreage has yet been published, but the average acreage for the five years 1892-96 was 11,280,000 acres. Maize is estimated to have yielded 79,337,000 bushels, or about $5\frac{1}{2}$ million bushels above the average annual production of the past five years.

NOTE.—Estimates of the results of this year's harvest in Hungary, India, Manitoba, Ontario, and Roumania were given in the September number of this Journal, Vol. V., No. 2.

PARLIAMENTARY PUBLICATIONS.

Agricultural Statistics, Ireland, 1898 [C. 9006]. Price 2½d.

This Parliamentary paper contains a report relating to migratory agricultural labourers, showing their distribution in Ireland when at home, their relative proportion to the population, their social position when at home as measured by the extent of their holdings, their destination, and the number who left the several Irish ports from 1st January to 31st August, 1898. It appears from returns collected by enumerators that there were in June last 17,902 persons, or 0·38 per cent. of the population, according to the census of 1891, who had either left or intended to leave their homes to seek employment as agricultural labourers elsewhere. The corresponding number for 1897 was 16,237, showing an increase of 1,665 in the present year. More than four-fifths of the entire number for 1898, namely, 14,535, were natives of the province of Connaught, and 9,519 of them came from the county of Mayo, which furnishes over one-half of all the Irish migratory labourers. The next province in importance is Ulster, which furnished 3,063 migratory labourers, of whom 2,770 (or 90·4 per cent.) were natives of the county of Donegal. The proportion of migratory labourers to the adult male population of Mayo was found to be no less than 18·3 per cent. It should be noted that the Midland Great Western Railway returns show that 24,259 harvestmen were conveyed by that company to Dublin during the season of 1898, while 13,450 labourers are estimated to have left Irish ports (other than Dublin) for temporary employment in England or Scotland.

Reports of the Principal Chemist upon the work of the Inland Revenue Branch of the Government Laboratory, for 1896-7 and 1897-8. C—9034 and 9035. Price 1½d. each.

These publications contain particulars of the analyses of beer and beer materials, tobacco, naphtha, alcohol, etc., etc.,

performed for the Revenue Departments; as well as of miscellaneous samples sent by other Government Departments. Of the total number of analyses (65,313 in 1897-8) nearly 95 per cent. were for the Revenue Departments; 12,952 samples in the latter year being of worts and materials (in connection with the beer duty); 11,817 of tobacco, for moisture; 9,157 of medicinal tinctures, for drawback; and 8,857 of beer, for exportation.

The samples analysed at the Government Laboratory on behalf of the Board of Agriculture were far more numerous than for any other branch of the Government; they numbered 1,071 in 1896-7 and 1,516 in 1897-8. The great majority of these were of imported dairy produce, and details concerning these are given elsewhere (p. 369). Of other articles analysed by Dr. Thorpe on behalf of the Board mention may be made of feeding-stuffs, and particularly samples of cakes which were suspected, and found, to contain anthrax germs.

Annual Local Taxation Returns (England and Wales), 1896-7.

These accounts of the receipts and expenditure of the various local bodies in England and Wales are issued in seven parts*, of which the last forms a summary of the information detailed in the other six. This summary shows that the aggregate receipts (excluding loans) of all these local authorities in 1896-7 were £66,512,267, and the expenditure out of these receipts £64,710,459, both these totals having steadily increased during the last five years.

The chief item in the receipts was rates, which amounted to £37,542,016, equivalent to 4s. 6½d. in the pound on the rateable value, or £1 4s. 5d. per head of the estimated population. The metropolitan rate, 5s. 8¾d. in the pound, was considerably above the 4s. 2½d., which was the average in the rest of England and Wales. All these rates have shown a steady increase from year to year during the past quinquennium.

* The numbers and prices of these Parliamentary papers are as follows:—Part I., No. 250, price 1s.; Part II., No. 351, 6½d.; Part III., No. 351, I., 5s. 6d.; Part IV., No. 351, II., 9½d.; Part V., No. 289, 6d.; Part VI., No. 325, 7d.; and Part VII. (summary), No. 351 III., 1s. 1½d.

The poor-rate valuation, on which the above rates are calculated, was £165,990,085 at the beginning of the year. The details of the accounts in connection with the relief of the poor, and of the valuation for poor rate in different unions, are contained in Part I. of these returns. The total sum raised on account of poor rates was £22,166,996, or 2s. 8d. in the pound. This rate was highest (3s. 4½d.) in London, and lowest in the northern division of England, where it averaged 1s. 10d. only. Of this sum of £22,166,996, however, considerably more than half was paid as contributions required by precepts to other local authorities—principally as payments for county, borough, and police rates—the amount raised for the purposes of the poor-law authorities being £9,493,750 only, of which again some portion was devoted to purposes partly or wholly unconnected with poor relief. The gross expenditure immediately connected with this relief was £10,432,189; of this sum “receipts in aid” represented £2,596,851, leaving £7,835,338 (including salaries, but excluding the maintenance of pauper lunatics) as the net expenses, directly connected with relief, borne by the poor rate.

The most important of the other items contributing to the receipts of local authorities were £6,218,516 from the Local Government Board out of the Local Taxation Account; Treasury subventions amounted to £3,390,501; tolls, dues, and duties to £3,695,712; revenue from waterworks to £3,166,824, and from gasworks to £4,864,381, various smaller items making up the total. The main heads of expenditure (other than poor relief) were £7,466,758 on education, and and £7,742,285 on highways and their maintenance; £6,379,641 on water, gas, and sewerage works; £4,825,728 on police, etc., etc.; while £13,758,833 represented payments in respect of principal and interest of loans.

Of the receipts more intimately connected with agriculture during the year 1896-7, it may be noted that grants under the Agricultural Rates Act, 1896, appear for the first time in these accounts, this instalment amounting to £25,916. Market rents, tolls, stallages, etc., yielded £755,161; slaughterhouses, £28,648; bridge and ferry tolls, etc.,

£118,853. The Corporation of London received £18,444 as grain duty.

The expenditure, not defrayed out of loans, includes a sum of £41,420 under the Contagious Diseases (Animals) Acts; this was more than in the two preceding years, but less than in 1892-4. Sewerage and sewage disposal works cost £1,434,306; markets and fairs, £350,308; bridges and ferries, £199,315; slaughter-houses, £21,750; expenditure under the Sale of Food and Drugs Acts, £19,717; expenses under the Small Holdings Act, £1,070.

Rents of allotments amounted to £36,835; the expenses under this head to £50,969. Most of the transactions concerning these allotments were in the hands of parish councils; the receipts of these bodies (including parish meetings) from this source amounting in the year under review to £22,998, and their expenses to £24,826; the corresponding receipts in 1895-6 having been £9,506, and the expenditure £12,000. The various urban authorities spent £21,227 on allotments in 1896-7. In addition to these expenses, there was raised during the year a sum of £12,627 in loans (over two-thirds by town councils) for this purpose.

It may be noted that the total amount of loans raised during 1896-7 by all local authorities for all purposes was £13,340,217, approximately the average of the four preceding years; the total amount outstanding at the end of the year was £252,135,574, this indebtedness having steadily increased during the past ten years.

Ireland.—Final Report of the Commission on Manual and Practical Instruction in Primary Schools under the Board of National Education, Ireland. [C.—8923.] Price 7½d.

In referring to agriculture as one of the various branches of manual and practical instruction in primary schools, the Commissioners observe that they do not think that agriculture as an art is a subject that properly belongs to elementary education. At present the study of the theory of agriculture is compulsory for boys in all rural schools, but inquiry has

shown that this study consists for the most part in committing a text-book to memory, and has little educational or practical value. The Commissioners recommend instead that the course of elementary science to be taught in rural schools should be so framed as to illustrate the more simple scientific principles that underlie the art and industry of agriculture. They also recommend the maintenance and extension of school gardens as a means by which these scientific principles may be illustrated and made interesting to the pupils ; but they do not consider the maintenance of school farms, the object of which is to teach agriculture, properly belongs to the functions of a board of primary education. As regards the Model Farm at Glasnevin and the Munster Dairy School, the Commissioners think that they could be made more useful for the purposes of agricultural education if placed in charge of an Agricultural Department.

Money Lending. Report from the Select Committee on Money Lending, together with the proceedings of the Committee, minutes of evidence, appendix and index [H.C. 260].
Price 2s. 3½d.

This volume contains the report of the Select Committee appointed in 1898 to inquire into the alleged evils attendant upon the system of money-lending by professional money-lenders, at high rates of interest, or under oppressive conditions as to repayment.

The Committee state, *inter alia*, that they have received important evidence as to the operation of co-operative banks on the Continent, and in some parts of the United Kingdom, and that it appears that the establishment of such banks has been of great use in abolishing, or largely diminishing, the trade of lending money at exorbitant rates of interest to the poorer classes. The Committee observe that they are impressed with the extreme usefulness of these institutions, and that they are of opinion that they meet a real want, especially in agricultural districts. They do not, however, recommend any State intervention in connection with them at the present time.

PRICES OF LIVE STOCK.

RETURNED UNDER THE WEIGHING OF CATTLE ACT.

Returns for the three months ending 30th September, 1898, received by the Board of Agriculture from the places scheduled under the Markets and Fairs (Weighing of Cattle) Act, 1891, are now available for comparison with those previously published in this Journal.

The number of stock of all kinds entering the markets at the twenty-one places making returns shows a marked increase over the numbers returned in the corresponding period of 1897. The comparative figures for the present and two preceding years are as follows:—

Animals.	3rd Quarter, 1898.	3rd Quarter, 1897.	3rd Quarter, 1896.
CATTLE :	No.	No.	No.
Entering markets - - - -	262,395	223,323	227,346
Weighed - - - -	32,274	26,024	24,471
Prices returned - - - -	28,799	23,037	22,481
Prices returned with quality distinguished.	23,804	18,172	16,857
SHEEP :			
Entering markets - - - -	1,593,030	1,380,624	1,424,166
Weighed - - - -	12,878	12,290	11,028
Prices returned with quality distinguished.	10,956	10,485	8,476
SWINE :			
Entering markets - - - -	75,125	44,428	46,431
Weighed - - - -	479	696	1,346
Prices returned with quality distinguished.	467	474	503

NOTE.—The figures for 1898 include the returns from Carlisle and Falkirk.

The number of cattle entering the markets was thus 39,072 in excess of last year. Of this increase only 12,499 are accounted

for by the addition of Carlisle and Falkirk to the list of returning markets. The increase in the case of sheep shown in the markets is 212,406, over the figures of the like quarter of 1897, the two new markets furnishing statistics explaining, however, rather more than half of this increase. The number of pigs sent for sale increased by 30,697, only 2,592 of which were reported from Carlisle and Falkirk. The increase in the numbers of cattle shown was especially marked at Norwich, Wakefield, York, and Glasgow. An increased number of sheep entered the markets at every scheduled place except Bristol, Leicester, Lincoln, London, and Salford. So far, therefore, as the twenty-one places making returns may be taken as an index for the country, the figures appear to show that more stock than usual were sent to market during July, August, and September this year, a fact for which the exceptional character of the season may in some measure be held to account.

The proportion of cattle weighed again shows an increase of about one per cent., but there is no progress, but rather the reverse, in the case of sheep and pigs. In two markets, Birmingham and York, no cattle, and in ten markets no sheep, appear to have been weighed, while, except at Newcastle, the practice of weighing pigs can scarcely be said to exist, and at Newcastle the returns indicate that a reference to live weight in selling is more popular for pigs than the use of the weighbridge for any other description of stock.

Quotations of prices of cattle, in the form prescribed, were rendered during the quarter in 23,804 cases out of the 32,274 animals weighed, and in the markets where the numbers of weighings were considerable, as at Carlisle and Liverpool in England, and Aberdeen and Falkirk in Scotland, the price has been reported for each head of cattle weighed; while the same result was nearly achieved at Dundee, Glasgow, and Shrewsbury; but in London prices for little over a third of the weighed cattle, and for scarcely any of the weighed sheep, have been reported in the three months.

The subjoined table gives, for the same markets as were

selected in the two preceding quarters of the current year, the number of fat cattle of each quality weighed and priced, with the prices per live stone and per live cwt. respectively :—

PLACES.	INFERIOR or Third Quality.			GOOD or Second Quality.			PRIME or First Quality.		
	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.
		<i>s. d.</i>	<i>s. d.</i>		<i>s. d.</i>	<i>s. d.</i>		<i>s. d.</i>	<i>s. d.</i>
Carlisle - - -	592	3 33	26 6	552	3 91	30 2	276	4 03	32 6
Leeds - - -	3	3 6	28 0		3 73	29 0	238	4 0	32 0
Liverpool - - -	—	—	—	248	3 62	28 6	1,955	4 1	32 8
London - - -	4	2 11	23 6	685	4 01	32 2	611	4 51	35 6
Newcastle - - -	7	3 33	26 4	4	3 82	29 10	217	4 31	34 2
Shrewsbury - - -	61	3 03	24 4	406	3 86	29 6	133	4 31	34 2
Aberdeen - - -	997	3 0	24 0	2,542	3 11	31 6	1,514	4 31	34 6
Dundee - - -	167	3 4	26 8	1,976	3 10	31 2	1,108	4 13	33 2
Edinburgh - - -	—	—	—	3,000	4 12	33 0	334	4 23	33 10
Falkirk - - -	155	3 63	28 6	484	3 11	31 8	348	4 23	33 10
Glasgow - - -	314	3 10	30 10	577	4 01	32 2	1,723	4 23	33 6
Perth - - -	193	3 91	30 2	438	4 03	32 6	267	4 4	34 8

Returns of prices accompanied by live-weight are given least frequently in the case of “inferior” or third-quality beasts, but for first and second quality animals the prices afford a basis of comparison. The general range of prices for these qualities appears, so far as these figures show, to have been almost precisely the same in the third as in the second quarter of the year.

The prices for the three months ending September with those for the corresponding period of last year compare as follows :—

PLACES.	INFERIOR or Third Quality.		GOOD or Second Quality.		PRIME or First Quality.	
	1898.	1897.	1898.	1897.	1898.	1897.
	Per Cwt. <i>s. d.</i>	Per Cwt. <i>s. d.</i>	Per Cwt. <i>s. d.</i>	Per Cwt. <i>s. d.</i>	Per Cwt. <i>s. d.</i>	Per Cwt. <i>s. d.</i>
Carlisle - - -	26 6	—	30 2	—	32 6	—
Leeds - - -	28 0	28 0	29 0	30 0	32 0	32 4
Liverpool - - -	—	—	28 6	30 2	32 8	32 10
London - - -	23 6	28 8	32 2	33 6	35 6	38 0
Newcastle - - -	26 4	27 10	29 10	30 0	34 2	37 6
Shrewsbury - - -	24 4	25 10	29 6	31 8	34 2	34 4
Aberdeen - - -	24 0	25 2	31 6	34 0	34 6	36 10
Dundee - - -	26 8	27 0	31 2	32 6	33 2	35 8
Edinburgh - - -	—	—	33 0	34 0	33 10	35 10
Falkirk - - -	28 6	—	31 8	—	33 10	—
Glasgow - - -	30 10	30 8	32 2	33 0	33 6	36 2
Perth - - -	30 2	31 6	32 6	34 2	34 8	36 6

There is thus a marked decline in the general level of values of fat cattle of all qualities in 1898 as compared with 1897. This is especially to be noted in the case of prime beasts, which sold last year during the quarter at an average varying from 32s. 4d. per cwt. (at Leeds) up to 38s. (in London), whereas this year the lowest average, which was again that from Leeds, stands at 32s., and the highest, in London, only reaches 35s. 6d.

The returns show that as many as 3,434 fat cattle actually changed hands at an agreed price per cwt. or per stone live-weight. Nine-tenths of such transactions were reported from Scotland, the greater number being at Glasgow and at Falkirk, the practice at the last-named mart being to sell all weighed cattle in this way.

Store cattle were reported as weighed at five places during the quarter, and prices were given from four markets ; but the total numbers thus sold were small except at Shrewsbury and at Edinburgh, where 1,038 and 260 stores were sold respectively, the prices varying from 27s. 2d. per cwt. for third-class stores to 32s. for those of prime quality.

The usual table giving details of the stock, of all descriptions, entering and weighed at each of the scheduled markets is given on the next page.

Cattle, Sheep, and Swine, entering the Markets and Marts of the undermentioned Places, with the Number Weighed, as received from the Market Authorities in the **Third Quarter** of 1898, under the Markets and Fairs (Weighing of Cattle) Act, 1891 (54 & 55 Vict. c. 70).

PLACES.	Cattle.			Sheep.			Swine.		
	Total Number entering the Markets or Marts.	Number Weighed.	Number Weighed for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weighed for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weighed for which Prices were given.
ENGLAND.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Ashford - - -	3,379	15	—	41,956	10	—	3,802	—	—
Birmingham - -	5,483	—	—	37,655	—	—	32,922	—	—
Bristol - - -	12,139	45	45	38,965	—	—	—	—	—
Carlisle - - -	10,069	1,420	1,420	121,851	—	—	2,581	—	—
Leicester - - -	12,160	254	196	25,815	80	60	1,207	—	—
Leeds - - -	7,517	269	269	34,940	504	504	1,902	12	—
Lincoln - - -	1,257	2	2	15,470	—	—	2,458	—	—
Liverpool - - -	14,029	2,203	2,203	168,556	1,466	1,466	—	—	—
London - - -	18,820	3,626	1,300	153,600	1,803	32	—	—	—
Newcastle-upon-Tyne	21,792	228	228	115,644	—	—	5,840	435	435
Norwich - - -	18,326	38	—	74,148	—	—	5,526	—	—
Salford - - -	26,137	360	—	212,233	—	—	358	—	—
Shrewsbury - - -	9,326	1,853	1,638	35,991	8	—	4,824	13	13
Wakefield - - -	23,070	231	106	73,015	—	—	3,592	—	—
York - - -	16,679	—	—	54,967	—	—	722	—	—
SCOTLAND.									
Aberdeen - - -	11,820	5,053	5,053	89,783	6,799	6,799	5,582	—	—
Dundee - - -	4,145	3,324	3,251	8,858	366	356	297	—	—
Edinburgh - - -	16,115	6,495	*3,594	56,964	20	—	1,578	—	—
Falkirk - - -	2,430	987	987	3,556	—	—	11	—	—
Glasgow - - -	15,109	2,823	2,614	148,103	133	50	1,519	—	—
Perth - - -	12,593	3,048	*898	80,960	1,689	1,689	404	19	19
TOTAL for ENGLAND	200,183	10,544	7,407	1,204,806	3,871	2,062	65,734	460	448
TOTAL for SCOTLAND	62,212	21,730	*16,397	338,224	9,007	8,894	9,391	19	19
Total - -	262,395	32,274	*23,804	1,593,030	12,878	10,956	75,125	479	467

* Prices for 2,845 cattle in addition to the above were quoted from Edinburgh, and for 2,150 cattle from Perth, but without distinguishing the quality.

PRICES OF MEAT, CORN, AND DAIRY PRODUCE.

AVERAGE PRICES of DEAD MEAT, per Stone of 8 lbs., at the LONDON CENTRAL MEAT MARKET, during the third Quarter, and during the Months of September, October, and November, 1898.

Compiled from the prices quoted weekly in the "Meat Trades Journal.")

DESCRIPTION.	3RD QUARTER 1898.		SEPTEMBER, 1898.		OCTOBER, 1898.		NOVEMBER, 1898.	
	s.	d.	s.	d.	s.	d.	s.	d.
BEEF :—								
Scotch, short sides - - -	4	0 to 4	4	0 to 4	4	0 to 4	4	1 to 4
„ long sides - - -	3	8 „ 3	3	7 „ 3	3	8 „ 3	3	9 „ 3
English - - - - -	3	7 „ 3	3	6 „ 3	3	4 „ 3	3	7 „ 3
Cows and Bulls - - -	2	1 „ 2	2	1 „ 2	2	2 „ 2	2	1 „ 2
American, Birkenhead killed -	3	2 „ 3	3	2 „ 3	3	1 „ 3	3	2 „ 3
„ Deptford killed -	3	3 „ 3	3	4 „ 3	3	1 „ 3	3	3 „ 3
Argentine „ „ - - -	2	8 „ 3	2	8 „ 3	2	7 „ 2	2	8 „ 3
American Refrig. hind-qrs -	3	8 „ 3	3	8 „ 3	3	8 „ 3	3	8 „ 3
„ „ fore-qrs -	2	1 „ 2	2	1 „ 2	2	3 „ 2	2	5 „ 2
Australian, Frozen hind-qrs -	1	8 „ 1	1	9 „ 1	2	2 „ 2	2	0 „ 2
„ „ fore-qrs -	1	2 „ 1	1	2 „ 1	1	7 „ 1	1	10 „ 1
New Zealand „ hind-qrs -	2	0 „ 2	2	1 „ 2	2	4 „ 2	2	3 „ 2
„ „ fore-qrs -	1	3 „ 1	1	3 „ 1	1	9 „ 1	1	11 „ 2
MUTTON :—								
Scotch, Prime - - - -	4	3 „ 4	4	4 „ 4	4	0 „ 4	4	3 „ 4
English, Prime - - - -	3	10 „ 4	4	1 „ 4	3	8 „ 4	3	10 „ 4
Ewes - - - - -	2	10 „ 3	2	9 „ 3	2	6 „ 2	2	10 „ 3
Continental - - - -	3	4 „ 3	3	4 „ 4	2	11 „ 3	3	3 „ 3
River Plate, Town killed -	3	1 „ 3	3	0 „ 3	2	10 „ 3	3	2 „ 3
New Zealand, Frozen - -	1	9 „ 2	1	9 „ 2	1	9 „ 2	2	0 „ 2
Australian, Frozen - - -	1	7 „ 1	1	7 „ 1	1	8 „ 1	1	9 „ 1
River Plate, Frozen - - -	1	7 „ 1	1	7 „ 1	1	9 „ 1	1	10 „ 1
LAMB :—								
English - - - - -	4	7 „ 5	4	6 „ 5	4	2 „ 4	—	—
New Zealand, Frozen - -	3	0 „ 3	3	4 „ 3	3	3 „ 3	3	2 „ 3
VEAL :—								
English - - - - -	3	11 „ 4	4	1 „ 4	4	1 „ 4	4	2 „ 4
Foreign - - - - -	3	6 „ 3	3	11 „ 4	3	5 „ 3	3	7 „ 4
PORK :—								
English, best - - - -	3	8 „ 4	3	10 „ 4	4	1 „ 4	3	11 „ 4
„ secondary - - - -	3	3 „ 3	3	3 „ 3	3	7 „ 4	3	5 „ 3
Foreign - - - - -	3	3 „ 3	3	3 „ 3	3	7 „ 4	3	5 „ 3

AVERAGE WHOLESALE PRICES of CATTLE and SHEEP, per Stone of 8 lbs., sinking the offal, at the METROPOLITAN CATTLE MARKET, during the undermentioned Quarters of 1897 and 1898.

PERIOD.	CATTLE.			SHEEP.		
	Inferior.	Second.	First.	Inferior.	Second.	First.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
3rd Quarter, 1897	2 4	4 0	4 7	3 7	5 0	5 8
4th Quarter „	2 4	3 10	4 5	3 4	4 11	5 7
1st Quarter, 1898	2 4	3 9	4 4	3 4	5 1	5 9
2nd Quarter „	2 4	3 7	4 2	2 10	4 5	5 2
3rd Quarter „	2	3 8	4 3	3 1	4 8	5 5

AVERAGE WHOLESALE PRICES OF BEEF and MUTTON, per Stone of 8 lbs., by the Carcase, at LIVERPOOL and GLASGOW, during the undermentioned Quarters of 1897 and 1898.

PERIOD.	LIVERPOOL.*				GLASGOW.†			
	BEEF.		MUTTON.		BEEF.		MUTTON.	
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
3rd Quarter, 1897	2 8	to 3 8	3 4	to 4 8	2 4	to 3 8	3 4	to 4 4
4th Quarter „	2 0	„ 3 5	2 10	„ 4 10	2 4	„ 3 8	3 0	„ 4 6
1st Quarter, 1898	2 0	„ 3 6	3 4	„ 4 8	2 4	„ 3 8	3 0	„ 4 8
2nd Quarter „	2 4	„ 3 2	3 8	„ 4 10	2 8	„ 3 6	3 4	„ 4 8
3rd Quarter „	2 4	„ 3 6	3 2	„ 4 8	2 4	„ 3 6	3 4	„ 4 6

* Compiled from information furnished by the Medical Officer of Health, Liverpool. The prices quoted are for Carcases of Animals slaughtered at the Liverpool Abattoir, and do not apply to Imported Meat.

† Compiled from information furnished by the Principal of the Veterinary College, Glasgow.

BERLIN MARKET.

AVERAGE PRICES of CATTLE and SHEEP (First Quality Dead Weight) in the BERLIN CATTLE MARKET in the under-mentioned Months of 1898.

MONTHS.	CATTLE.		SHEEP.	
	Per Cwt.		Per Cwt.	
1898.	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
August - - -	63 11	to 68 6	61 1	to 64 2
September - - -	64 5	„ 69 3	62 4	„ 65 5
October - - -	62 11	„ 68 0	61 11	„ 65 2
November - - -	62 10	„ 67 9	63 8	„ 65 8

NOTE.—The above prices have been compiled from the weekly returns published in the *Deutsche Landwirthschaftliche Presse*.

PARIS MARKET.

AVERAGE PRICES of CATTLE, SHEEP, and SWINE (Medium Quality) in the PARIS CATTLE MARKET in the under-mentioned Months of 1898.

MONTHS.	OXEN.	CALVES.	SHEEP.	PIGS.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
LIVE WEIGHT.				
1898.	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
September - - -	30 0	40 0	33 3	40 3
October - - -	27 0	38 7	33 7	38 1
November - - -	28 6	41 3	34 10	39 1
DEAD WEIGHT.				
1898.	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
September - - -	46 3	64 4	65 10	57 4
October - - -	44 7	64 4	67 2	54 2
November - - -	50 3	69 0	66 3	56 0

NOTE.—The above prices have been compiled from the weekly returns published in the *Journal d'Agriculture Pratique*.

CHICAGO.

PRICES of CATTLE at CHICAGO per Cwt. (Live Weight) in the under-mentioned Months of 1898.

Months.	Good Dressed Beef and Shipping Steers.		Export Cattle.		Extra Prime Cattle.	
1898.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
September -	21 6	to 25 2	21 0	to 25 8	25 0	to 27 4
October -	21 6	„ 25 2	21 0	„ 25 8	25 2	„ 27 6
November -	22 2	„ 25 8	20 6	„ 26 2	25 2	„ 27 6

Compiled from the Live Stock Reports issued by Messrs. Clay, Robinson, and Co. of the Union Stock Yards, Chicago, Illinois.

AVERAGE VALUES, per Cwt., of various Kinds of DEAD MEAT Imported into the United Kingdom from FOREIGN COUNTRIES and BRITISH POSSESSIONS in the under-mentioned Quarters of 1897 and 1898.

(Computed from the Trade and Navigation Accounts.)

PERIOD.	BEEF.		MUTTON.	PORK.		BACON.	HAMS.
	Fresh.	Salted.	Fresh.	Fresh.	Salted.		
3rd Quarter, 1897 -	s. d. 37 2	s. d. 24 7	s. d. 30 9	s. d. 43 3	s. d. 20 3	s. d. 35 10	s. d. 43 5
4th Quarter „ -	37 7	24 9	30 5	43 7	21 2	36 9	41 2
1st Quarter, 1898 -	40 8	25 11	28 10	42 11	25 10	34 6	39 9
2nd Quarter „ -	39 3	26 9	29 8	41 10	22 9	36 5	39 2
3rd Quarter „ -	37 8	26 1	30 0	41 9	20 5	37 1	39 1

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels,* computed from the Weekly Averages of Corn Returns from the 196 Returning Markets of ENGLAND AND WALES, pursuant to the Corn Returns Act, 1882, together with the QUANTITIES returned as sold at such Markets, in the under-noted periods of the Years 1898, 1897, and 1896.

QUARTER ENDED	PRICES.			QUANTITIES.		
	1898.	1897.	1896.	1898.	1897.	1896.
Wheat.						
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
Lady Day - - -	35 1	29 7	25 8	699,657	619,679	448,047
Midsummer - - -	41 5	27 6	25 2	557,504	619,618	384,559
Michaelmas - - -	32 8	30 4	23 7	308,279	635,698	505,988
Christmas - - -	—	33 3	30 5	—	881,566	772,427
Barley.						
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
Lady Day - - -	27 9	24 0	22 5	902,452	784,713	955,902
Midsummer - - -	26 10	21 4	21 4	47,621	78,488	92,739
Michaelmas - - -	25 10	21 6	21 0	99,743	118,875	165,722
Christmas - - -	—	27 0	27 1	—	2,275,111	2,177,499
Oats.						
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
Lady Day - - -	17 5	16 4	13 9	226,150	194,193	259,565
Midsummer - - -	19 10	17 3	14 3	93,475	79,707	99,672
Michaelmas - - -	19 7	17 10	14 6	78,787	75,824	94,383
Christmas - - -	—	16 5	16 7	—	200,710	201,533

* Section 8 of the Corn Returns Act, 1882, provides that where returns of purchases of British Corn are made to the local inspector of Corn Returns in any other measure than the imperial bushel or by weight or by a weighed measure that officer shall convert such returns into the imperial bushel, and in the case of weight or weighed measure the conversion is to be made at the rate of 60 imperial pounds for every bushel of wheat, 50 imperial pounds for every bushel of barley, and 39 imperial pounds for every bushel of oats.

CORN PRICES :—HARVEST YEAR.

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Weekly Averages of Corn Returns from the 196 Returning Markets, together with the QUANTITIES returned as sold at such Markets during each of the Harvest Years ending 31st August 1890 to 1898.

HARVEST YEARS.	PRICES.			QUANTITIES.		
	Wheat.	Barley.	Oats.	Wheat.	Barley.	Oats.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
1889-90 - - -	31 2	28 10	18 6	3,289,836	3,281,141	558,053
1890-91 - - -	35 5	28 0	19 1	3,406,788	3,659,382	602,887
1891-92 - - -	33 4	27 2	20 8	3,267,038	3,260,327	488,830
1892-93 - - -	30 8	24 10	18 9	2,675,227	3,383,094	547,412
1893-94 - - -	25 5	20 5	18 4	2,087,062	3,876,977	542,425
1894-95 - - -	21 5	21 5	14 8	2,180,959	3,136,415	693,121
1895-96 - - -	24 10	22 4	14 1	1,640,943	3,366,394	672,547
1896-97 - - -	28 8	23 2	16 9	2,597,268	3,200,612	551,912
1897-98 - - -	36 2	26 11	18 3	2,534,224	3,339,842	599,666

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Returns received under the Corn Returns Act, 1882, in each of the under-mentioned Weeks in 1898, and in the corresponding Weeks in 1897 and 1896.

Weeks ended (<i>in 1898</i>).	Wheat.			Barley.			Oats.		
	1898.	1897.	1896.	1898.	1897.	1896.	1898.	1897.	1896.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Jan. 1 -	34 6	30 6	25 2	27 3	24 8	24 7	17 1	16 2	13 10
„ 8 -	34 11	31 1	25 4	27 9	25 5	23 11	16 10	16 3	13 9
„ 15 -	35 0	31 8	25 10	27 8	24 10	23 6	17 4	16 5	13 11
„ 22 -	34 11	31 7	26 1	27 10	25 5	23 7	17 5	16 6	13 10
„ 29 -	34 6	31 3	26 3	27 8	24 7	23 1	17 2	16 8	14 1
Feb. 5 -	34 10	30 7	26 4	28 0	24 10	22 5	17 6	16 7	14 0
„ 12 -	35 1	29 8	26 7	27 8	24 8	21 11	17 5	16 6	14 0
„ 19 -	35 0	28 11	26 3	27 11	23 9	21 10	17 8	16 5	13 9
„ 26 -	35 5	28 2	25 6	27 6	23 8	21 10	17 10	16 3	13 10
Mar. 5 -	35 10	28 3	25 4	28 0	23 0	21 5	17 11	16 3	13 8
„ 12 -	35 8	27 11	25 5	27 10	22 11	21 3	17 9	16 2	13 10
„ 19 -	35 6	27 11	25 1	28 0	22 8	21 1	17 10	16 2	13 9
„ 26 -	35 4	27 9	24 10	28 6	22 5	21 4	17 8	16 3	13 4
Apl. 2 -	35 3	27 10	24 7	27 11	22 3	21 10	17 10	16 3	13 3
„ 9 -	35 2	27 8	24 6	27 0	22 7	21 0	17 11	16 6	13 1
„ 16 -	35 3	27 0	24 11	28 0	23 0	23 6	18 2	16 3	14 0
„ 23 -	36 1	26 6	25 6	28 3	20 7	21 0	18 4	16 7	13 11
„ 30 -	38 4	27 9	25 8	27 10	20 5	22 6	18 11	17 3	14 3
May 7 -	42 4	28 4	25 7	27 8	21 5	21 0	20 4	16 11	14 4
„ 14 -	45 11	27 11	25 7	27 1	20 2	21 0	20 1	17 7	14 5
„ 21 -	48 1	28 1	25 6	26 0	19 10	21 8	21 3	17 9	14 6
„ 28 -	47 9	28 2	25 4	26 5	21 3	21 5	21 5	17 10	14 10
June 4 -	46 3	27 10	25 5	26 10	20 8	21 6	21 0	17 9	14 8
„ 11 -	45 4	27 4	25 1	25 8	22 8	19 3	20 11	17 11	14 9
„ 18 -	42 4	27 0	25 1	26 1	23 9	22 8	20 5	18 0	15 1
„ 25 -	40 8	27 0	24 10	24 3	19 9	19 5	20 7	18 6	14 10
July 2 -	38 3	27 1	24 9	23 4	18 10	16 2	20 8	18 7	15 0
„ 9 -	36 10	27 4	24 7	25 0	17 4	18 11	20 5	18 8	14 9
„ 16 -	37 1	27 7	24 2	24 1	17 6	18 3	20 10	18 3	15 4
„ 23 -	38 1	28 1	24 0	25 0	18 10	19 8	20 10	18 11	15 0
„ 30 -	36 11	28 10	23 8	24 2	17 10	19 7	20 11	19 0	14 10
Aug. 6 -	35 7	29 5	23 6	26 11	17 9	19 5	20 7	18 11	14 9
„ 13 -	33 8	29 8	22 11	27 5	19 0	21 1	20 9	17 4	14 6
„ 20 -	32 7	30 4	22 4	24 4	19 2	21 11	19 11	17 2	14 3
„ 27 -	30 7	31 8	22 5	27 6	22 5	21 10	19 3	17 1	13 7
Sept. 3 -	28 1	33 7	23 1	27 8	25 11	21 11	18 11	17 0	13 11
„ 10 -	26 10	33 1	23 9	27 9	27 4	23 4	17 10	17 3	14 1
„ 17 -	25 7	33 10	24 0	26 10	28 11	24 8	16 10	17 0	14 6
„ 24 -	25 5	33 11	24 4	26 9	29 7	26 3	17 1	16 8	14 1
Oct. 1 -	25 9	33 4	25 2	27 0	29 10	28 7	16 7	16 4	14 9
„ 8 -	26 6	32 1	26 7	27 5	28 9	29 5	16 7	16 0	15 3
„ 15 -	26 6	31 10	27 10	27 11	28 3	29 7	16 6	16 1	15 9
„ 22 -	26 8	32 2	28 11	28 1	27 5	28 6	16 6	16 2	16 0
„ 29 -	27 4	32 10	30 9	28 8	27 5	28 3	16 8	16 0	17 3
Nov. 5 -	28 4	33 5	31 6	28 6	26 10	7 5	17 2	16 5	17 6
„ 12 -	28 4	34 0	31 9	28 7	26 3	3	17 5	16 3	17 7
„ 19 -	28 1	33 11	32 11	28 5	26 2	2 8	17 2	16 5	17 7
„ 26 -	27 9	33 8	33 4	28 4	25 9	26 9	17 1	16 8	17 7
Dec. 3 -	27 7	33 9	32 8	28 6	25 10	26 2	17 1	16 9	17 0
„ 10 -	27 6	33 9	32 2	28 6	26 0	25 4	17 3	16 6	16 8
„ 17 -	27 2	34 1	31 3	28 5	26 4	24 10	17 0	17 0	16 7
„ 24 -	—	34 4	30 9	—	26 11	24 1	—	17 0	16 1

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in BELGIUM in the under-mentioned Months of 1898.

Month.	Wheat.	Barley.	Oats.
1898.	s. d.	s. d.	s. d.
August - - - - -	34 3	20 8	20 10
September - - - - -	29 1	21 2	17 10
October - - - - -	30 3	23 2	17 8

The above prices have been compiled from the official monthly averages published in the *Moniteur Belge*.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in FRANCE, and ENGLAND and WALES in the under-mentioned Months of 1898.

MONTH.	FRANCE.	ENGLAND.
WHEAT.		
1898.	Per Qr. s. d.	Per Qr. s. d.
September - - - - -	37 4	26 5
October - - - - -	37 7	26 6
November - - - - -	37 5	28 1
BARLEY.		
1898.	Per Qr. s. d.	Per Qr. s. d.
September - - - - -	22 8	27 3
October - - - - -	22 5	27 9
November - - - - -	22 7	28 5
OATS.		
1898.	Per Qr. s. d.	Per Qr. s. d.
September - - - - -	19 0	17 8
October - - - - -	18 4	16 6
November - - - - -	18 5	17 2

Note.—The prices of French grain have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*. The prices of British grain are official averages based on the weekly returns furnished under the Corn Returns Act, 1882.

**AVERAGE PRICES of WHEAT, BARLEY, and OATS per
IMPERIAL QUARTER at the under-mentioned Markets in
the under-mentioned Months of 1898.**

Month.	London.	Paris.	Breslau.
WHEAT.			
1898.	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d. s. d.</i>
September - - -	27 1	37 7	33 5 to 36 9
October - - -	28 1	37 5	33 8 „ 37 0
November - - -	29 7	37 1	33 1 „ 36 4
BARLEY.			
1898.	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d. s. d.</i>
September - - -	29 1	22 1	23 5 to 27 1
October - - -	31 0	21 3	24 3 „ 27 10
November - - -	28 11	20 9	24 9 „ 28 5
OATS.			
1898.	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d. s. d.</i>
September - - -	18 9	19 9	17 2 to 21 7
October - - -	17 7	17 8	17 0 „ 18 9
November - - -	17 11	17 11	17 4 „ 18 4

Note.—The London quotation represents the price of British corn as returned under the Corn Returns Act, 1882; the price of grain in Paris is the official average price of French wheat in that city; the quotations shown for Breslau represent the prices of grain of good merchantable quality.

PRICES OF WOOL.

**PRICES OF ENGLISH WOOL, per pack of 240 lbs., in the
under-mentioned Months of 1898.**

(Compiled from the *Economist*.)

DESCRIPTION.	September, 1898.		October, 1898.		November, 1898.	
	<i>£ s.</i>	<i>£ s.</i>	<i>£ s.</i>	<i>£ s.</i>	<i>£ s.</i>	<i>£ s.</i>
South Down - - -	8 0	to 9 5	8 0	to 10 0	8 0	to 10 0
Half breds - - -	7 15	„ 8 10	7 15	„ 8 10	7 4	„ 8 3
Leicester - - -	7 15	„ 8 10	7 15	„ 8 10	7 4	„ 8 3
Kent Fleeces - - -	7 10	„ 8 10	7 10	„ 8 10	7 3	„ 8 3

III.—PRICES OF BUTTER, MARGARINE, AND CHEESE.
 MEAN WHOLESALE PRICES of BUTTER, MARGARINE, and
 CHEESE in the under-mentioned Months of 1898.

(Compiled from the *Grocer*.)

DESCRIPTION.	September. 1898.		October. 1898.		November. 1898.	
	Per Cwt.		Per Cwt.		Per Cwt.	
	s.	d.	s.	d.	s.	d.
BUTTER :						
Cork, 1sts - - -	85	0	92	0	87	6,,
„ 2nds - - -	79	6	87	0	82	0,,
„ 3rds - - -	71	6	80	6	78	6,,
„ 4ths - - -	68	0	69	6	65	0,,
Friesland - - -	92	6 to 96	100	0 to 103	99	0,, 102
Dutch Factories - -	94	6,, 98	103	0,, 105	102	0,, 104
French Baskets - -	107	0,, 111	109	0,, 115	111	0,, 120
Crocks and Firkins - - -	100	6,, 104	100	6,, 105	104	6,, 109
„ 2nds and 3rds - -	90	0,, 96	92	6,, 97	97	0,, 102
Danish and Swedish -	107	0,, 110	115	0,, 117	112	0,, 116
Finnish - - -	91	6,, 101	95	0,, 104	88	0,, 103
Russian - - -	84	6,, 93	82	6,, 93	76	0,, 91
Canadian and States -	73	6,, 98	73	6,, 102	70	6,, 98
Argentine - - -	—	—	—	—	—	—
Colonial, fine- - -	—	—	111	0,, 114	102	6,, 107
„ good and - - -	—	—	—	—	—	—
inferior - - -	—	—	90	0,, 102	88	6,, 98
Fresh Rolls (Foreign) per doz. - - -	10	6,, 14	11	6,, 14	10	6,, 14
MARGARINE :						
Margarine - - -	27	6,, 57	29	6,, 60	30	0,, 60
Mixtures - - -	47	0,, 75	50	0,, 79	50	0,, 80
CHEESE :						
Cheddar - - -	38	0,, 65	41	0,, 73	45	0,, 72
Somerset - - -	42	0,, 60	42	6,, 62	47	0,, 63
Cheshire - - -	65	0,, 70	70	0,, 74	69	0,, 77
Wiltshire - - -	56	0,, 61	57	0,, 63	57	0,, 64
Double Gloucester -	33	6,, 47	42	6,, 50	38	0,, 52
Derby - - -	39	6,, 45	43	0,, 47	40	0,, 49

WEEKLY PRICES (WHOLESALE) of VEGETABLES and FRUIT
at COVENT GARDEN MARKET.

(Compiled from the *Gardeners' Chronicle*.)

	Week ending							
	3rd Nov.		10th Nov.		17th Nov.		24th Nov.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
VEGETABLES—								
Artichokes, Globe, per dozen	2	0 to 3	0	2	0 to 3	0	2	0,, 3
Beans, Dwarf, Channel Islands, per lb.	0	6	—	0	4,, 0	6	0	10,, 1
Beetroots, new, per dozen	0	6,, 0	9	0	6,, 0	9	0	6,, 0
Brussels Sprouts, per sieve	2	0,, 2	6	2	0,, 4	0	2	0,, 1
Cabbage, per dozen	0	9,, 1	3	0	9,, 1	3	0	1
Cabbage, Savoy, per dozen	1	6,, 1	9	1	6,, 1	9	1	3,, 1
Carrots, washed, in bags	3	6	—	3	0,, 3	6	3	0,, 3
Carrots, Surrey, bunches	2	0,, 4	0	2	0	2	0	2
Cauliflowers, per dozen	1	3,, 2	0	1	6,, 2	0	1	3,, 2
Celery, White, per dozen	6	0,, 8	0	6	0,, 8	0	6	0,, 8
Cucumbers, per dozen	1	6,, 3	0	1	6,, 4	0	1	6,, 4
Endive, English, per score	1	0	—	1	0	—	1	0
Horseradish, per bundle	2	0,, 2	6	2	0,, 2	6	2	0,, 2
Lettuce, Cos, per dozen	—	—	—	3	0,, 3	6	3	0,, 3
Mushrooms, House, per lb.	0	6,, 0	8	0	8,, 0	10	0	10,, 1
Mushrooms, Outdoor, per lb.	0	2,, 0	3	0	2,, 0	4	0	2,, 0
Onions, English, per cwt.	5	0,, 5	0	5	0,, 5	6	5	0,, 5
Onions, Dutch, per bag	4	0	—	4	0	—	4	0,, 4
Parsley, per sieve	1	0	—	0	9,, 1	0	9	0,, 1
Parsnips, per cwt.	3	6	—	3	0	—	3	0
Potatoes, Hebrons, Snowdrops, Up-to-Date, etc., per ton	60	0,, 85	0	60	0,, 85	0	60	0,, 80
Radishes, Round, per dozen bunches	1	6,, 1	9	1	6,, 1	9	1	6,, 2
Salad, Small, per dozen punnets	1	3	—	1	3	—	1	3
Shallots, per cwt.	10	0	—	9	0,, 10	0	9	0,, 10
Spinach, per bushel	5	0	—	5	0,, 6	0	5	0,, 6
Tomatoes, English, per lb.	0	2,, 0	5	0	5,, 0	6	0	5,, 0
Tomatoes, Bordeaux, boxes	1	3,, 2	6	1	3,, 2	6	1	6,, 2
Turnips, per dozen bunches	2	6,, 3	6	2	6	—	2	6
Watercress, per dozen bunches	0	3,, 0	6	0	3,, 0	6	0	3,, 0
FRUIT—								
Apples, King, per sieve	2	6,, 3	6	2	6,, 3	6	2	6,, 3
Apples, Ribstons, per sieve	4	0,, 5	0	4	0,, 5	0	4	0,, 5
Apples, Cox's Orange Pippin, per sieve	—	—	—	4	0,, 7	0	4	0,, 7
Apples, large Cooking, per bushel	3	0,, 5	0	3	0,, 5	0	4	0,, 6
Apples, Nova Scotia, various, per barrel	15	0,, 20	0	15	0,, 20	0	15	0,, 20
Cobnuts, per 100 lbs.	50	0,, 55	0	50	0,, 55	0	45	0,, 50
Grapes, English Alicante, per lb.	0	10,, 1	3	0	10,, 1	3	0	10,, 1
Grapes, Gros Colmar, per lb.	1	0,, 1	6	1	0,, 1	6	1	0,, 1
Grapes, Channel Isles, per lb.	0	6	—	0	4,, 0	9	0	5,, 0
Grapes, Muscats, per lb.	1	3,, 3	0	1	0,, 2	6	1	0,, 2
Grapes, Almeira, per barrel	12	0,, 14	0	13	0,, 25	0	13	0,, 25
Pears, Californian, cases—								
Duchess	5	0	—	5	0	—	5	0
Glou Morceau	10	0	—	7	0,, 8	6	7	0,, 8
Pears, French crates, Magnifique, Duchess	—	—	—	—	—	—	15	0
Pears, Stewing, baskets	4	0	—	4	0,, 5	0	5	0,, 6
Pineapples, each	1	6,, 4	6	1	6,, 4	0	1	6,, 4

DISEASES OF ANIMALS IN GREAT BRITAIN.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Board of Agriculture, in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUTBREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUTBREAKS Confirmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
June, 1897 -	3	25	197	700	13,131
September, 1897 -	1	4	71	392	8,026
December, 1897 -	1	3	23	278	5,731
March, 1898 -	1	1	220	578	11,466
June, 1898 -	—	—	—	879	15,352
September, 1898 -	—	—	—	550	8,017

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax** and **Glanders** in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).	
	OUTBREAKS Reported.	ANIMALS Attacked.	OUTBREAKS Reported.	ANIMALS Attacked.
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
June, 1897 -	109	201	230	393
September, 1897 -	93	171	249	437
December, 1897 -	102	204	225	458
March, 1898 -	156	245	197	381
June, 1898 -	169	254	195	337
September, 1898 -	92	134	188	361

NUMBER OF CASES of **Rabies** in DOGS in GREAT BRITAIN during each of the under-mentioned periods.

THREE MONTHS ENDED	Number of Cases.
30th June, 1897 -	42
30th September, 1897 -	40
31st December, 1897 -	21
31st March, 1898 -	8
30th June, 1898 -	6
30th September, 1898 -	1

DISEASES OF ANIMALS IN IRELAND.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Lord Lieutenant and Privy Council in IRELAND, in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUT- BREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUT- BREAKS Con- firmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	No.	No.	No.	No.
June, 1897 -	—	—	—	136	1,571
September, 1897 -	—	—	—	120	749
December, 1897 -	—	—	—	38	655
March, 1898 -	—	—	—	81	1,039
June, 1898 -	—	—	—	97	1,225
September, 1898 -	—	—	—	105	1,269

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax**, **Glanders**, and **Rabies** in Ireland in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).		Rabies.	
	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	CASES REPORTED.	
					DOGS.	OTHER ANIMALS.
	No.	No.	No.	No.	No.	No.
June, 1897 -	1	1	1	2	139	41
Sept., 1897 -	—	—	1	1	110	29
Dec., 1897 -	—	—	—	—	26	16
March, 1898 -	1	8	—	—	13	2
June, 1898 -	—	—	1	1		11
Sept., 1898 -	1	3	2	4	31	12

POST OFFICE SAVINGS BANKS, WITH GOVERNMENT SECURITY.

ADVANTAGES OFFERED FOR OLD AGE PENSIONS.

Provision for old age can be made by buying Savings Bank Deferred Annuities from £1 to £100 to begin at any age selected.

RETURN OF PURCHASE MONEY. The Premiums for Deferred Annuities can be returned on application, or on Death before the Annuity begins, if the Contract is taken out on these conditions.

IMMEDIATE PENSIONS. Annuities to begin at once, of any amount from £1 to £100 a year, can be bought through the Post Office Savings Bank. The Purchase Money is payable in a lump sum which is not returnable, and the Pensions are payable half-yearly.

Savings Banks Annuities are payable by half-yearly instalments on the 5th January and the 5th July, or the 5th April and 10th October, according to the date of purchase.

PROCEDURE. A simple form of Proposal, and a form for statement of age, can be obtained at any Post Office Savings Bank. When filled up the forms will be forwarded by the local Postmaster to the Chief Office, London, and a Contract will be issued when the first premium has been paid. Annuity Premiums are payable in the same way as Insurance Premiums, namely, by transfers from Savings Bank accounts.

OLD AGE PENSIONS.—DEFERRED LIFE ANNUITIES.

The Annuity Tables below give the cost of an Annuity of £1, and an Annuity of a larger amount costs larger sum in exact proportion. For instance, a Pension of £10 a year would cost ten times the amount given below. In this class of Annuities the Purchase Money will be returned on application, or on the death of the nominee, if an instalment of the Annuity shall not have become due. These Pensions can be Deferred any number of years from 10 to 50, and any cost not given below will be furnished on application to the Controller, Post Office Savings Bank, London.

Purchase Money Returnable Scale.

Age at time of Purchase.	Cost of an Annuity of £1 payable after the expiration of 10 YEARS.				Cost of an Annuity of £1 payable after the expiration of 20 YEARS.			
	Males.		Females.		Males.		Females.	
	In 11 Yearly Sums of	In one Sum at time of Purchase.	In 11 Yearly Sums of	In one Sum at time of Purchase.	In 21 Yearly Sums of	In one Sum at time of Purchase.	In 21 Yearly Sums of	In one Sum at time of Purchase.
21 and under 22	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
22 " 23	1 12 5	15 15 9	1 15 10	17 9 0	0 13 0	10 15 1	0 14 6	11 19 3
23 " 24	1 12 0	15 11 10	1 15 5	17 5 1	0 12 10	10 11 8	0 14 3	11 15 6
24 " 25	1 11 7	15 7 11	1 15 0	17 1 1	0 12 7	10 8 4	0 14 0	11 11 9
25 " 26	1 11 3	15 4 0	1 14 7	16 17 0	0 12 5	10 4 10	0 13 9	11 7 10
26 " 27	1 10 10	15 0 0	1 14 2	16 12 11	0 12 2	10 1 4	0 13 6	11 3 10
27 " 28	1 10 5	14 16 0	1 13 9	16 8 8	0 12 0	9 17 10	0 13 3	10 19 9
28 " 29	1 10 0	14 11 11	1 13 4	16 4 4	0 11 9	9 14 3	0 13 0	10 15 6
29 " 30	1 9 7	14 7 10	1 12 10	16 0 0	0 11 6	9 10 7	0 12 9	10 11 3
30 " 31	1 9 2	14 3 9	1 12 5	15 15 6	0 11 4	9 6 10	0 12 6	10 6 10
31 " 32	1 8 8	13 19 6	1 11 11	15 10 11	0 11 1	9 3 1	0 12 3	10 2 6
32 " 33	1 8 3	13 15 3	1 11 5	15 6 3	0 10 10	8 19 2	0 12 0	9 18 1
33 " 34	1 7 10	13 11 0	1 10 11	15 1 6	0 10 7	8 15 2	0 11 9	9 13 8
34 " 35	1 7 5	13 6 8	1 10 5	14 16 7	0 10 4	8 11 2	0 11 5	9 9 2
35 " 36	1 6 11	13 2 3	1 9 11	14 11 7	0 10 1	8 7 0	0 11 2	9 4 6
36 " 37	1 6 6	12 17 9	1 9 5	14 6 6	0 9 10	8 2 10	0 10 11	8 19 11
37 " 38	1 6 0	12 13 3	1 8 11	14 1 3	0 9 7	7 18 6	0 10 7	8 15 2
38 " 39	1 5 6	12 8 7	1 8 4	13 15 10	0 9 4	7 14 1	0 10 4	8 10 4
39 " 40	1 5 1	12 3 11	1 7 9	13 10 4	0 9 1	7 9 6	0 10 0	8 5 5
40 " 41	1 4 7	11 19 2	1 7 2	13 4 10	0 8 9	7 4 10	0 9 9	8 0 7
41 " 42	1 4 1	11 14 4	1 6 7	12 19 2	0 8 6	7 0 2	0 9 5	7 15 8
42 " 43	1 3 7	11 9 4	1 6 0	12 13 7	0 8 3	6 15 7	0 9 2	7 10 9
43 " 44	1 3 0	11 4 3	1 5 6	12 7 11	0 7 11	6 11 2	0 8 10	7 5 10
44 " 45	1 2 6	10 19 1	1 4 10	12 2 1	0 7 8	6 6 9	0 8 6	7 1 0
45 " 46	1 2 0	10 13 9	1 4 3	11 16 3	0 7 5	6 2 4	0 8 3	6 16 0
46 " 47	1 1 5	10 8 4	1 3 8	11 10 3	0 7 2	5 18 0	0 7 11	6 11 0

Purchase Money not Returnable Scale.

21 and under 22	1 10 3	14 2 4	1 14 0	16 1 5	0 11 0	8 5 11	0 12 11	9 19 2
22 " 23	1 9 10	13 18 1	1 13 7	15 17 3	0 10 10	8 2 2	0 12 8	9 15 4
23 " 24	1 9 5	13 13 8	1 13 2	15 13 1	0 10 7	7 18 5	0 12 5	9 11 5
24 " 25	1 8 11	13 9 4	1 12 9	15 8 10	0 10 4	7 14 7	0 12 2	9 7 6
25 " 26	1 8 6	13 4 10	1 12 4	15 4 6	0 10 2	7 10 9	0 11 11	9 3 6
26 " 27	1 8 1	13 0 5	1 11 10	15 0 1	0 9 11	7 6 11	0 11 8	8 19 5
27 " 28	1 7 8	12 15 11	1 11 5	14 15 7	0 9 8	7 3 1	0 11 5	8 15 3
28 " 29	1 7 2	12 11 5	1 10 11	14 11 1	0 9 5	6 19 2	0 11 2	8 11 0
29 " 30	1 6 9	12 6 10	1 10 6	14 6 5	0 9 3	6 15 4	0 10 11	8 6 9
30 " 31	1 6 3	12 2 3	1 10 0	14 1 9	0 9 0	6 11 4	0 10 8	8 2 5
31 " 32	1 5 10	11 17 8	1 9 6	13 16 11	0 8 9	6 7 5	0 10 5	7 17 11
32 " 33	1 5 4	11 13 0	1 9 0	13 12 1	0 8 6	6 3 6	0 10 1	7 13 5
33 " 34	1 4 11	11 8 3	1 8 6	13 7 2	0 8 3	5 19 6	0 9 10	7 8 10
34 " 35	1 4 5	11 3 6	1 8 0	13 2 1	0 8 0	5 15 6	0 9 6	7 4 2
35 " 36	1 3 11	10 18 9	1 7 6	12 16 11	0 7 9	5 11 5	0 9 3	6 19 5
36 " 37	1 3 5	10 13 11	1 6 11	12 11 8	0 7 6	5 7 5	0 8 11	6 14 8
37 " 38	1 3 0	10 9 1	1 6 5	12 6 4	0 7 3	5 3 4	0 8 8	6 9 10
38 " 39	1 2 6	10 4 2	1 5 10	12 0 10	0 7 0	4 19 2	0 8 4	6 4 11
39 " 40	1 2 0	9 19 2	1 5 3	11 15 3	0 6 9	4 15 1	0 8 0	6 0 0
40 " 41	1 1 6	9 14 2	1 4 8	11 9 7	0 6 6	4 10 10	0 7 9	5 14 11
41 " 42	1 0 11	9 9 1	1 4 1	11 3 9	0 6 2	4 6 8	0 7 5	5 9 10
42 " 43	1 0 5	9 4 0	1 3 5	10 17 9	0 5 11	4 2 5	0 7 1	5 4 9
43 " 44	0 19 11	8 18 10	1 2 10	10 11 9	0 5 8	3 18 1	0 6 9	4 19 7
44 " 45	0 19 4	8 13 7	1 2 2	10 5 6	0 5 4	3 13 9	0 6 5	4 14 4
45 " 46	0 18 10	8 8 3	1 1 6	9 19 3	0 5 1	3 9 5	0 6 1	4 9 1

OLD AGE PENSIONS.—IMMEDIATE LIFE ANNUITIES.

This Table shows the cost of an Immediate Life Annuity of £1, and an Annuity of a larger amount costs a larger sum in exact proportion. For instance, a Pension of £10 a year would cost ten times the amount given below.

AGE			Males.	Females.	AGE			Males.	Females.
at time of Purchase.			Cost of an Immediate Annuity of £1.	Cost of an Immediate Annuity of £1.	at time of Purchase.			Cost of an Immediate Annuity of £1.	Cost of an Immediate Annuity of £1.
			£ s. d.	£ s. d.				£ s. d.	£ s. d.
5 and under	6		25 19 0	27 12 6	44 and under	45		16 15 8	18 13 3
6	7		25 15 1	27 9 1	45	46		16 9 11	18 6 9
7	8		25 11 1	27 5 8					
8	9		25 7 0	27 2 2	46	47		16 4 2	18 0 0
9	10		25 2 11	26 18 8	47	48		15 18 3	17 13 2
10	11		24 18 10	26 15 1	48	49		15 12 3	17 6 1
					49	50		15 6 1	16 18 11
11	12		24 14 9	26 11 6	50	51		14 19 11	16 11 9
12	13		24 10 6	26 7 10					
13	14		24 6 4	26 4 1	51	52		14 13 6	16 4 7
14	15		24 2 1	26 0 4	52	53		14 7 1	15 17 4
15	16		23 17 10	25 16 6	53	54		14 0 5	15 9 11
					54	55		13 13 8	15 2 4
16	17		23 13 6	25 12 7	55	56		13 6 9	14 14 9
17	18		23 9 1	25 8 8					
18	19		23 4 9	25 4 8	56	57		12 19 8	14 6 11
19	20		23 0 4	25 0 8	57	58		12 12 5	13 19 0
20	21		22 15 10	24 16 6	58	59		12 4 11	13 11 1
					59	60		11 17 4	13 3 1
21	22		22 11 4	24 12 4	60	61		11 9 8	12 15 1
22	23		22 6 9	24 8 1					
23	24		22 2 3	24 3 10	61	62		11 2 2	12 7 0
24	25		21 17 7	23 19 5	62	63		10 14 11	11 19 0
25	26		21 12 11	23 15 0	63	64		10 7 8	11 11 0
					64	65		10 0 6	11 2 11
26	27		21 8 3	23 10 6	65	66		9 13 4	10 14 7
27	28		21 3 6	23 5 11					
28	29		20 18 9	23 1 3	66	67		9 6 4	10 6 4
29	30		20 13 11	22 16 6	67	68		8 19 7	9 18 1
30	31		20 9 1	22 11 8	68	69		8 12 10	9 9 10
					69	70		8 6 2	9 1 10
31	32		20 4 2	22 6 9	70	71		7 19 5	8 14 2
32	33		19 19 2	22 1 9					
33	34		19 14 2	21 16 7	71	72		7 12 10	8 6 10
34	35		19 9 2	21 11 5	72	73		7 6 4	7 19 10
35	36		19 4 1	21 6 2	73	74		7 0 1	7 13 0
					74	75		6 14 1	7 6 4
36	37		18 18 11	21 0 9	75	76		6 8 4	6 19 10
37	38		18 13 9	20 15 3					
38	39		18 8 6	20 9 7	76	77		6 2 8	6 13 7
39	40		18 3 2	20 3 11	77	78		5 17 4	6 7 5
40	41		17 17 10	19 18 0	78	79		5 12 3	6 1 6
					79	80		5 7 2	5 15 9
41	42		17 12 4	19 12 1	80 or any greater age.				5 10 3
42	43		17 6 10	19 5 11					
43	44		17 1 4	18 19 8					

LIST OF LEAFLETS ISSUED BY THE BOARD OF AGRICULTURE.

Number.	Title.
Leaflet No. 1	Mites on Currant and Nut Trees.
" " 2	Vine and Raspberry Weevils.
" " 3	The Turnip Fly or Flea.
" " 4	Caterpillars on Fruit Trees.
" " 5	The Mangel Wurzel Fly.
" " 6	The Field Vole.
" " 7	Autumn Catch Crops and Fodder Supply.
" " 9	Farmers and Assessments to Local Rates.
" " 10	Ensilage.
" " 11	Wireworms.
" " 12	The Daddy Longlegs.
" " 13	The Gooseberry Saw-Fly.
" " 14	Acorn Poisoning.
" " 15	The Raspberry Moth.
" " 16	The Apple Blossom Weevil.
" " 17	The Apple Sucker.
" " 18	Preservation of Commons.
" " 19	Fertilisers and Feeding Stuffs Act.
" " 20	Pea and Bean Weevil.
" " 21	The Magpie Moth.
" " 22	The Warble Fly.
" " 23	The Diamond Back Moth.
" " 24	Potato Disease.
" " 25	The Ribbon Footed Corn-Fly.
" " 26	The Cockchafer.
" " 27	Farmers and the Income Tax.
" " 28	Remission of Tithe Rentcharge.
" " 29	Anthrax.
" " 30	Swine Fever.
" " 31	The Codlin Moth.
" " 32	The Onion Fly.
" " 33	Foul Brood or Bee Pest.
" " 34	Surface Caterpillars.
" " 35	The Woolly Aphis or American Bligh.
" " 36	The Celery Fly.
" " 37	Cultivation of Osiers.
" " 38	Rabies.
" " 39	The Carrot Fly.
" " 40	Assessments to Land Tax.
" " 41	The Kestrel or Windhover.
" " 42	The Red Spider or Spinning Mite.
" " 43	The Short-eared Owl.
" " 44	Titmice.
" " 45	The Common Lapwing or Plover.
" " 46	The Starling.
" " 47	The Stem Eelworm.
" " 48	The Asparagus Beetle.
" " 49	The Pea Thrips.
" " 50	The Fruit Tree Beetle.
" " 51	Water Wagtails or " Dishwashers. "
" " 52	The White or Barn Ow .
" " 53	Gooseberry Blight.
	The Pear Midge.

Copies of the above leaflets can be obtained free of charge and post free on application to the Secretary, Board of Agriculture, 4, Whitehall Place, London, S.W. Letters of application so addressed need not be stamped.

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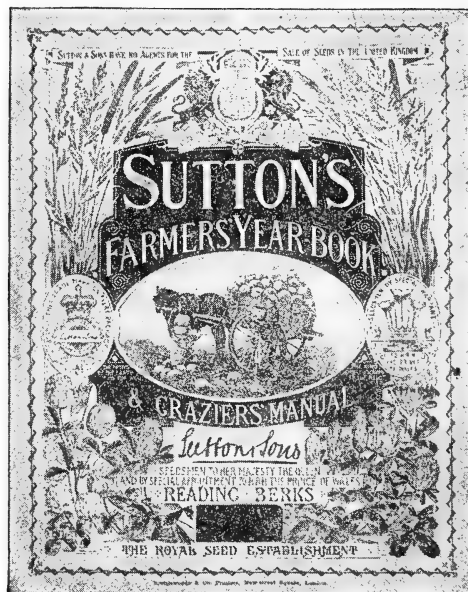
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THE PRINCE OF WALES.

The Journal

OF THE

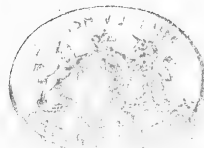
BOARD OF AGRICULTURE

MARCH, 1899.

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THE JOURNAL

OF THE

BOARD OF AGRICULTURE.

Vol. V. No. 4. MARCH, 1899.

THE BRITISH CROPS OF 1898.

Statements showing the total produce and estimated yield per acre of wheat, barley, and oats in Great Britain in the year 1898 were published in the December number of the Journal.* It is now possible to supplement this information by indicating, in advance of the complete details for each county, the corresponding figures for the remaining crops for which Produce Returns are collected, which, with the customary incidental statistics, will appear in the annual volume of the Agricultural Returns. The exceptionally high standard of production reached last year may be concisely shown by simply comparing the several crop-yields of 1898 in Great Britain with the difference of each above or below the ten years' average of 1888-97.

The estimated yield of every enumerated crop, with the

Crop.	Yield per Acre.	Above or Below Average.	Crop.	Yield per Acre.	Above or Below Average.
	<i>Bushels.</i>	<i>Bushels.</i>		<i>Tons.</i>	<i>Tons.</i>
Wheat - -	34'74	+5'55	Potatoes - -	6'26	+0'41
Barley - -	35'75	+2'78	Turnips - -	12'04	-1'46
Oats - -	40'76	+2'25	Mangolds - -	17'65	+0'30
				<i>Cwts.</i>	<i>Cwts.</i>
Beans - -	31'07	+4'28	Hay fr. Clover, etc.	33'65	+5'89
Peas - -	27'62	+1'92	Hay fr. Prmt. Grass	29'24	+6'29
			Hops - - -	7'17	-0'59

* Vol. V., No. 3, p. 289.

exception of Turnips and of Hops, exceeded the average of the previous decade, the Hay crops of both descriptions and the Wheat crop showing the largest excess over the average.

The total produce of the three cereals for England, Wales, and Scotland in 1898 and 1897 has already been given, and in now adding the estimates for Beans it may be remarked

Beans.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre, 1888-97.
	1898.	1897.	1898.	1897.	
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
England - - -	6,692,000	6,124,000	30·83	28·71	26·54
Wales - - - -	36,000	30,000	28·25	20·74	25·04
Scotland - - -	472,000	449,000	35·26	32·30	31·47
Great Britain - -	7,200,000	6,603,000	31·07	28·88	26·79

that although this crop was grown on only 231,747 acres, an area smaller than in any previous year, except 1897, the total produce exceeded that of any year since 1891—when the extent of land devoted to the crop was 123,000 acres greater.

Peas.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre, 1888-97.
	1898.	1897.	1898.	1897.	
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
England - - -	4,783,000	5,168,000	27·69	27·64	25·76
Wales - - - -	34,000	35,000	21·87	20·35	19·09
Scotland - - -	32,000	36,000	25·47	24·96	24·18
Great Britain - -	4,849,000	5,239,000	27·62	27·56	25·70

The yield of Peas was, as the table given above shows, fractionally better than in 1897, but owing to the diminished area, which now amounts to no more than 175,570 acres, there was a material reduction in the total results of the

crop. Wales had relatively a better return, as compared with the decennial average, than any other part of Great Britain.

The present importance of the Potato crop to British farmers, referred to in the last number of the Journal, renders it satisfactory to note that the estimate for 1898 exceeded the average yield per acre by nearly half a ton. There was, however, a considerable amount of local irregularity. In England, it is true, the excess of the yield was only one-fifth of a ton per acre above the average, and in Wales the yield was slightly under average; but in Scotland, where a fourth of the potato acreage is found, it was over average by more than a ton per acre. Diversity of results will be even more apparent in the returns from individual counties when they are available for examination; but it may be noted that in the two English counties—Lincoln and Lancaster—possessing the largest potato acreage the crop was a good one, and in only two of the Scotch counties did it fall below the average. The improvement in the Scotch crop of 1898 as compared with 1897 is specially noticeable.

Potatoes.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre, 1888-97.
	1898.	1897.	1898.	1897.	
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
England - - -	2,256,000	1,896,000	6·17	5·38	5·97
Wales - - -	185,000	166,000	5·62	5·10	5·64
Scotland - - -	842,000	546,000	6·66	4·55	5·56
Great Britain -	3,283,000	2,608,000	6·26	5·17	5·85

The diminished yield of the Turnip and Swede crop in 1898 was the principal blot upon the record of the year's productiveness. It is necessary to go back to 1887 to find so low a return for Great Britain as the twelve tons per acre shown by the Produce Returns of this season. In certain parts of the country, indeed, the root crop might almost be

described as a failure. In some counties the yield is estimated to have reached little more than half the average, and deficiencies of four, five, six, and even seven tons per acre have been returned. As the subjoined table shows, England alone was the sufferer, the yield per acre as a whole being $2\frac{1}{2}$ tons less than the ten years' average of under thirteen tons, while in Scotland it was half a ton in excess of the fifteen tons of the decennial average. The total turnip acreage in Great Britain was 1,772,502 acres, being about 60,000 acres less than in 1897.

Turnips and Swedes.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre, 1888-97.
	1898.	1897.	1898.	1897.	
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
England - - -	13,083,000	17,106,000	10·58	13·28	12·89
Wales - - -	1,012,000	1,114,000	14·84	15·84	14·90
Scotland - - -	7,242,000	7,432,000	15·50	15·64	15·00
Great Britain - -	21,337,000	25,652,000	12·04	13·99	13·50

Mangolds were grown on 352,235 acres and are almost exclusively an English crop. The yield was over average by nearly one-third of a ton per acre, although falling below the production of the previous year. In this case the variations of yield in different counties will be found considerable, and to range from $2\frac{1}{2}$ tons below to $4\frac{1}{2}$ tons above an average result.

Mangolds.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre, 1888-97.
	1898.	1897.	1898.	1897.	
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
England - - -	6,064,000	6,480,000	17·68	18·76	17·38
Wales - - -	129,000	126,000	16·39	16·07	16·11
Scotland - - -	25,000	22,000	18·04	16·04	16·50
Great Britain - -	6,218,000	6,628,000	17·65	18·69	17·35

The Hay crop of 1898, like that of wheat, proved, as has been generally recognised, greatly above the average, and showed a higher yield per acre than has been previously recorded since the Produce Returns were first collected, although in 1889 the estimate for Great Britain approached it very closely, and in the English counties slightly exceeded last year's record. It will be seen from the tables given below that clovers and rotation grasses gave nearly 6 cwts. per acre above an average, while permanent grass gave a little more than $6\frac{1}{4}$ cwts. in excess. Adding together the total yield of hay of all kinds, it will be found to amount to 10,639,000 tons, an aggregate in excess of any recorded year except 1889, when the acreage mown was considerably larger.

The past year's figures for hay from clovers and rotation grasses show that the yield per acre in England and Scotland was almost precisely the same; but as the calculated ten years' average is considerably higher on the north than on the south side of the Border, the crop of 1898 was relatively much better in England than in Scotland. It may be mentioned, too, in this connection, that whereas in England not a single county, and in Wales only one, appears to have fallen below the average, in Scotland there were several which fell below the standard. In fact, as between the north and south of the country the position of 1897 was reversed in 1898 with respect to the clover hay crop.

Hay cut from Clover and Rotation Grasses.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre, 1888-97.
	1898.	1897.	1898.	1897.	
	<i>Tons.</i>	<i>Tons.</i>	<i>Cwts.</i>	<i>Cwts.</i>	<i>Cwts.</i>
England - - -	3,034,000	2,434,000	34'09	28'75	27'48
Wales - - - -	285,000	248,000	28'52	25'26	22'58
Scotland - - -	688,000	638,000	34'21	32'13	31'06
Great Britain -	4,007,000	3,320,000	33'65	29'04	27'76

While the aggregate amount of clover hay cut last year has only once been exceeded, that of meadow hay was less than in two or three previous years, when the extent of land mown happened to be larger. The area—4,535,907 acres—of permanent pasture mown in 1898, although slightly exceeding that of 1897, was less than in most of the years previously recorded. Leaving Scotland out of account as possessing only 129,000 acres from which meadow hay was cut, it will be found that although variations occur in the yield recorded for different counties, in only two counties did the estimated yield of 1898 fall below the average.

Hay cut from Permanent Grass.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre, 1888-97.
	1898.	1897.	1898.	1897.	
	<i>Tons.</i>	<i>Tons.</i>	<i>Cwts.</i>	<i>Cwts.</i>	<i>Cwts.</i>
England - - -	5,883,000	4,963,000	29·92	25·44	23·33
Wales - - -	549,000	479,000	23·12	20·20	18·01
Scotland - - -	200,000	194,000	30·89	28·84	28·48
Great Britain - -	6,632,000	5,636,000	29·24	24·99	22·95

IMPORTS OF AGRICULTURAL PRODUCE.

The accounts relating to the trade and navigation of the United Kingdom for December last, although the figures are still subject to revision, complete the returns of imports and exports for the year, and permit of comparisons being made with former periods. Three-fourths of our imports of agricultural produce may conveniently be classified under the three heads of meat (including live animals for slaughter), dairy produce, and corn. The most salient feature of the first of these groups is the continued growth of our foreign meat supply ; while the returns of dairy produce reveal the somewhat novel distinction of a slight decline in the importation of butter, as well as cheese ; and the receipts of grain are chiefly characterised by an increase in quantity at an enhanced value.

The trade returns show our imports of live animals (for food) and dead meat during 1897 and 1898 to have been as shown in Table I. below.

Adding together the various items which make up our foreign meat supply, and expressing the live animals in terms of their estimated average dressed weight, it would appear that the total of imported meats of all kinds (excluding poultry and game) amounted to about 20,633,000 cwts., as compared with 19,550,000 cwts. in 1897, or an increase of 1,083,000 cwts. approximately. The total value of these imports amounted to £40,364,795, or £1,615,552 more than in the previous year.

Turning to the individual items, live cattle show a decline of nearly 50,000 head, and sheep an increase of 52,000 head, during the year. The decline in cattle occurs in the imports from the United States, whence we received 369,478 head as compared with 416,299 in 1897, and from Canada, which

supplied 108,406 as against 126,495 head; while Argentina increased its shipments from 73,852 to 89,368 head. In the case of sheep the last named Republic has again increased its consignments, sending 430,075 in 1898, as against 345,217 in 1897, while the numbers from the United States and Canada have again been diminished. The reappearance, although on a very small scale, of the import trade in swine was a feature of the year; 450 pigs coming from the United States in March and April.

The average value of imported cattle, viz., £16 10s. 4d. per head, is about 8s. lower than in 1897; imported sheep also showing a slight decrease.

TABLE I.

Imports of Live Animals (for Food) and Dead Meat.

DESCRIPTION.	QUANTITIES.		VALUES.	
	1897.	1898.	1897.	1898.
	No.	No.	£	£
Cattle - - - -	618,321	569,066	10,460,966	9,399,793
Sheep - - - -	611,504	663,749	919,096	984,863
Swine - - - -	—	450	—	1,020
Live Animals, Total - -	—	—	11,380,092	10,385,676
	Cwts.	Cwts.		
Beef, Fresh - - -	3,010,387	3,100,221	5,783,667	5,915,615
„ Salted - - -	174,936	208,945	215,901	273,004
Mutton - - - -	3,193,276	3,314,003	4,827,868	4,902,183
Pork, Fresh - - -	347,617	557,511	765,128	1,165,300
„ Salted - - -	237,206	276,044	253,693	319,858
Bacon - - - -	5,004,915	5,711,322	8,867,846	10,321,674
Hams - - - -	1,725,875	1,972,052	3,681,966	3,894,839
Meat Unenumerated, Salted or Fresh - - -	364,822	414,977	727,273	812,767
Meat Unenumerated, Preserved - - -	669,684	573,947	1,702,315	1,801,276
Rabbits (dead) - - -	276,458	314,398	543,494	572,603
Total Dead Meat - - -	15,005,176	16,443,420	27,369,151	29,979,119

The imports of all kinds of fresh meat—beef, mutton, and pork—in 1898 attained a higher total than any hitherto recorded. In the case of beef and mutton the increase was

comparatively small—about 100,000 cwts. in each instance; but the amount of fresh pork consigned to this country, although not in itself of great moment, was considerably above the highest hitherto recorded, viz., 347,617 cwts. in the previous year.

Fresh beef, as usual, comes chiefly from the United States (2,301,956 cwts.), the mutton from Australasia (1,934,108 cwts.), followed by Argentina (1,106,201 cwts.); it is to the latter country that the increase is due, Australasia showing a slight decline, for which the shipments from New South Wales were responsible. Last year was the first in which the Argentine shipments of fresh mutton attained a total of a million cwts.

The export of fresh pork from the United States appears to be practically a new development within the last two years only, for whereas that country had previously shipped only a few thousand cwts. per annum, it in 1897 sent over 61,000 cwts., and last year 276,789 cwts., thus surpassing by 54,000 cwts. the shipments from Holland, whence we had usually hitherto derived two-thirds of our foreign supply.

Of salt meat, bacon and hams also came in the largest quantities hitherto noted, the former, in fact, surpassing the previous highest by 14 per cent. The United States sent 4,087,389 cwts. of bacon, or practically half a million cwts. more than in 1897, while the Canadian contribution of 537,879 cwts. was not very far from double the exports of the previous year. Other kinds of salt meat also came in larger quantities than in 1897.

The value per cwt. of all kinds of dead meat imported works out exactly the same as in 1897—viz., 36s. 6d.

The imports of dairy produce, including margarine in this group, show a distinct decline during the year, the total weight of butter, cheese, and margarine being 6,508,420 cwts., as compared with 6,757,523 cwts. in 1897, while the total value was put at £23,314,592 and £24,287,808 in these two years respectively.

The falling off in the receipts of butter, though slight and amounting to 8,709 cwts. only, in this large section of our

imports represents a check which has not occurred since 1887. It is to be noted, however, that the value of the 3,209,093 cwts. received has at the same time somewhat increased, from £15,916,917 to £15,960,571, forming a fresh maximum, so that a cwt. of imported butter, which in 1897 was estimated at £4 18s. 11d., was last year put at £4 19s. 6d. Denmark increased her contribution of butter by 130,000 cwts., the 1,465,030 cwts. received thence representing 46 per cent. of our total imports. Canada also sent more than in 1897—viz., 156,865 cwts., as compared with 109,402; while reductions are reported from all other sources, the heaviest being in the consignments from the United States, which were little more than two-fifths of the amount in 1897, or 66,712 as against 154,196 cwts.

TABLE II.
Imports of Dairy Produce.

DESCRIPTION.	QUANTITIES.		VALUES.	
	1897.	1898.	1897.	1898.
	Cwts.	Cwts.	£	£
Butter - - - - -	3,217,802	3,209,093	15,916,917	15,960,571
Margarine- - - - -	936,543	899,875	2,485,370	2,383,774
Cheese - - - - -	2,603,178	2,339,452	5,885,521	4,970,247
Milk, Condensed and Preserved- -	756,243	817,268	1,398,363	1,435,913
Milk and Cream, Fresh - - -	10,006	10,691	9,848	11,193

The slight increase noted last year in margarine (over 90 per cent. of which comes from Holland) was not maintained, and only in 1886, when this commodity was first separately distinguished in the trade returns, were the imports less than the 899,875 cwts. received during the past year.

Cheese shows a decline of 264,000 cwts., none of the countries of origin specifically named in the trade returns showing an increase. The United States, whence only 486,000 cwts. came as against 631,616 cwts. in 1897, account for the greater part of this fall, and the more important Canadian quota showed a diminution from 1,526,664 to 1,432,181 cwts. Unlike butter, this commodity shows a decline in value from 45s. 3d. to 42s. 6d. per cwt.

Condensed milk reached a maximum in 1898, and the imports of fresh milk and cream were somewhat higher than in 1897, the greater part arriving in the first three months of the year.

Our imports of other animals and animal products are exhibited in the following table :—

TABLE III.

Imports of Miscellaneous Animals and Animal Products.

DESCRIPTION.	QUANTITIES.		VALUES.	
	1897.	1898.	1897.	1898.
Horses - - No.	49,519	42,921	£ 1,254,362	£ 1,145,328
Eggs - - Gt. Hund.	14,031,754	14,424,582	4,356,807	4,456,123
Poultry and Game -	—	—	730,725	636,488
Lard - - Cwts.	1,740,468	2,106,870	1,993,143	2,887,774
Tallow and Stearine „	1,950,925	2,021,921	1,869,929	2,066,433
Hides - - „	1,195,755	1,236,511	2,750,157	2,906,066
Wool (Sheep and } Lbs. Lambs') - }	735,627,420	689,346,799	24,436,871	23,437,309

It will be noticed that the imports of eggs were again greater, being about 400,000 great hundreds more than last year, the highest total previously shown. Russia, which had attained first place among our contributors of eggs in 1897, was again the source of our largest supplies with 3,646,000 great hundreds, an increase of over half a million in the year, while from Denmark and Canada substantial increases are also noted, but fewer French eggs by over half a million great hundreds were received. To these alterations in the geographical distribution of the origin of our imported eggs is due the slightly lower value quoted in 1898, the declared value of Russian eggs being about 23 a shilling in 1898, while of French, the most expensive, 15 are returned as worth that sum.

Lard came in augmented quantities, while its value was returned at, on the average, 27s. 5d. per cwt., as compared with 22s. 11d. in 1897.

The imports of wool amounted to 689,346,799 lbs., a decline of about 46 million lbs. The quantity retained for home

consumption was, however, larger than in 1897, for the re-exports—282,869,681 lbs.—were nearly 90 millions short of those of the earlier year; and, in fact, the quantity retained for consumption had never previously reached 400 million lbs. The whole of the decline in our receipts may be attributed to Australasia, whose consignments, amounting to 447,587,548 lbs., fell short by about 44 million lbs. of the quantity in the previous year. Other countries do not exhibit any very material change. The value per lb. was very slightly higher: whereas in 1897 it was estimated at a trifle under 8d., it was last year a small fraction under 8½d. per lb.

The imports of grain and flour in the two past years are recorded in the following table:—

TABLE IV.
Imports of Grain and Flour.

DESCRIPTION.	QUANTITIES.		VALUES.	
	1897.	1898.	1897.	1898.
	Cwts.	Cwts.	£	£
Wheat - - - -	62,740,180	65,228,330	23,363,503	26,136,620
Wheat Meal and Flour -	18,680,669	21,017,109	9,599,656	11,545,343
Barley - - - -	18,958,720	24,457,004	4,681,074	6,791,472
Oats - - - -	16,116,810	15,577,900	4,038,813	4,383,457
Oatmeal - - - -	732,495	989,480	434,672	615,925
Maize - - - -	53,785,380	57,169,292	9,188,708	11,282,310
Maize Meal - - -	1,029,301	1,453,800	261,120	379,485
Peas - - - -	2,820,135	2,179,062	771,055	689,899
Beans - - - -	2,840,050	2,293,346	762,275	670,159
Other Corn and Meal -	—	—	478,598	404,588
Total - - - -	—	—	53,579,474	62,899,258

The total quantity of wheat imported was about two-and-a-half million cwts. more than the amount recorded in the former year, but did not reach the total of 1896. Owing, however, to the rise in value (8s. per cwt. as compared with 7s. 5d. in 1897 and 6s. 2d. in 1896), the total value of the grain imported was higher than in any year since 1891. It may be

noted that the aggregate weight of wheat and wheat flour, expressed as wheat, was last year 94,419,000 cwts., whereas in 1897 it was 88,686,000 cwts.

Although the total quantity of wheat imported has been exceeded upon previous occasions, 1898 witnessed the arrival in our harbours of the largest amount of wheat and wheat flour (expressed as wheat) ever received from the United States, the quantity reaching 62,034,700 cwts., or 1,100,000 cwts. more than in 1892, the highest hitherto noted. Canada contributed 7,746,000 cwts. of wheat (grain and flour together) this representing the largest amount received from that colony, while the Indian quota exhibited a recovery to a level which has not been exceeded since 1892.

The imports of barley, which had shown some falling off in 1897, rose last year to 24,457,000 cwts. (the highest total since 1894), an increase of $5\frac{1}{2}$ million cwts., or 29 per cent. The increase was fairly generally distributed: Russia, with a total of 10,267,000, sending nearly three million cwts. more than in 1897, while from Roumania (4,734,760 cwts. in 1898) an increase of 1,460,000 cwts. is recorded. Oats, on the other hand, came in somewhat diminished consignments, only 3,344,220 cwts. coming from Russia, as against 5,463,480 in 1897 and 10,222,800 in 1896; and the pre-eminence attained by the United States in 1897 as a purveyor of this grain was accentuated by a shipment of 8,435,820 cwts., or about 350,000 cwts. more than in the earlier year. The imports of maize, 57,169,292 cwts., have again proved the highest on record, surpassing by nearly 3,400,000 cwts. the receipts of 1897. Maize flour also reached a maximum. It is noticeable that the supply of maize from the United States fell off by over two million cwts., attaining only 37,466,100 cwts., whereas the supply from Canada nearly doubled, the increase being from 4,235,400 to 7,972,500 cwts.

All the cereals imported were declared at an average value above that of 1897; barley being returned at 5s. 7d., as compared with 4s. 11d., oats at 5s. 8d., instead of 5s.; and maize at 3s. 11d., as against 3s. 5d., all per cwt.

In the following table are given the imports of such of the principal remaining commodities of vegetable origin as com-

pete more or less directly with produce grown in the United Kingdom :—

TABLE VI.
Miscellaneous Imports of Vegetable Produce.

DESCRIPTION.	QUANTITIES.		VALUE.	
	1897.	1898.	1897.	1898.
Onions - - - - bush.	6,108,924	6,002,515	£ 760,560	£ 792,907
Potatoes - - - - cwts.	3,921,205	6,752,728	1,200,328	1,913,912
Vegetables unenumerated - -	—	—	1,456,701	1,680,734
Apples - - - - bush.	4,199,971	3,458,646	1,187,303	1,107,058
Pears - - - - „	1,051,877	491,649	377,900	221,772
Plums - - - - „	1,043,819	922,212	497,783	434,666
Cherries - - - - „	312,294	401,810	178,131	230,828
Hay - - - - tons	121,541	116,107	—	—
Straw - - - - „	91,724	71,966	—	—
Hops - - - - cwts.	164,154	244,136	524,297	1,030,140
Flax - - - - tons	98,802	97,252	3,203,184	2,932,621
Hemp - - - - „	89,019	94,442	1,763,402	2,308,480
Wood and Timber (except Mahogany) - - - loads	9,976,902	8,834,250	22,990,142	20,594,494
Clover and Grass Seeds - cwts.	299,946	342,673	579,258	654,941

Potatoes, it will be seen, showed a large augmentation from 3,921,205 cwts. to 6,752,728 cwts., a total which has not been touched since 1880, when 9,750,000 cwts. were imported. While the Channel Islands, France, and other countries all share to a greater or less degree in this increase, Germany, whence we had of late received only small consignments, last year furnishing 1,953,638 cwts., as compared with 358,008 cwts in 1897.

THE FERTILISERS AND FEEDING STUFFS ACT, 1893.

Reports received by the Board of Agriculture show that samples were received under the Fertilisers and Feeding Stuffs Act, 1893, in fifty-five counties or county boroughs during the year 1898, the total number of analyses having been 987, of which 698 were fertilisers and 289 feeding stuffs.

The reports exhibit a substantial increase in the number of samples analysed as compared with the previous year, an increase being recorded in all three divisions of Great Britain, although in England it is much greater than in Scotland, and the number in the latter country has not attained the figure of 1896.

The comparison for the last three years stands as follows:—

	Number of Counties reporting Analyses.			Total Number of Samples Analysed.		
	1898.	1897.	1896.	1898.	1897.	1896.
England, Counties -	27	29	26	445	391	362
„ Boroughs -	2	2	4	128	77	40
Wales, Counties -	6	7	5	49	41	22
Scotland, Counties -	20	18	20	365	341	378
„ Boroughs -	—	1	—	—	2	—
GREAT BRITAIN -	55	57	55	987	852	802

From the appended summary of the samples analysed in each county or county borough from which analyses were reported in 1897 or 1898 it will be seen that of the whole increase of 135 samples no less than 84 were in the

county of Wilts and the borough of Canterbury ; also that the eastern counties of England (north of the Thames) continue to be distinguished by the small use made of the Act.

Reviewing briefly the statistics of the five years during which the Act has been in force, it appears that the number of counties in which samples were reported to have been analysed shows very little alteration from year to year ; the number (including boroughs) having been fifty-four in 1894 and fifty-five in 1898. This is about half the number of authorities appointing analysts.

The following table summarises the number of samples analysed in the three divisions of Great Britain since 1894 :—

	1894	1895	1896	1897	1898	Total five years.
England - - -	224	276	402	468	573	1,943
Wales - - -	6	23	22	41	49	141
Scotland - - -	214	322	378	343	365	1,622
Total - - -	444	621	802	852	987	3,706

The comparatively small use made of the Act in the eastern or arable counties of England has always been a feature since the returns were collected. Four-fifths of the whole number of samples taken in England have been analysed in the western or grazing section (1,563 out of 1,943). But here, also, the Act has been practically utilised in very different proportions in different counties. Thus, 1,145 of the 1,563 were taken in the counties of Monmouth (508, including Newport), Westmorland, Salop, Somerset, and Dorset, leaving 418 for the remainder. Over a quarter of the whole number of samples taken in England were thus taken in Monmouthshire. Greater progress is also to be recorded in the west than in the east ; and it may further be noted that had it not been for Canterbury the samples analysed in the arable section would have shown in 1898 an increase of only 2 over 1894, while the number returned by that borough alone in 1898 was equal to the number in the whole of the remainder of the arable section of England.

In Scotland, also, Perthshire occupies a pre-eminent position, the samples in that county amounting in five years to 436, or more than a fourth of the whole.

It is also to be remarked that no analyses have yet been reported under the Act since it came into force in the counties of Berks, Bucks, Cambridge, Huntingdon, Isle of Ely, Isle of Wight, Northampton, Nottingham, Rutland, Anglesey, Carnarvon, Merioneth, Radnor, Clackmannan, Elgin, Haddington, Inverness, Nairn, Orkney, Shetland, and Sutherland.

COUNTIES REPORTING ANALYSES.	1898. Number of Samples Analysed.			1897. Number of Samples Analysed.		
	Ferti- lisers.	Feed- ing Stuffs.	Total.	Ferti- lisers.	Feed- ing Stuffs.	Total.
ENGLAND :						
Chester - - - - -	7	3	10	7	4	11
Cornwall - - - - -	5	—	5	—	—	—
Cumberland - - - - -	5	—	5	1	—	1
Devon - - - - -	11	5	16	11	4	15
Dorset - - - - -	4	25	29	12	20	32
Durham - - - - -	6	2	8	13	2	15
Essex - - - - -	15	1	16	20	1	21
Gloucester - - - - -	7	1	8	1	2	3
Hants - - - - -	6	1	7	—	1	1
Hereford - - - - -	13	2	15	6	—	6
Hertford - - - - -	—	—	—	—	2	2
Kent - - - - -	7	1	8	6	—	6
Lancaster - - - - -	—	1	1	—	—	—
Leicester - - - - -	—	1	1	1	1	2
Lincoln, Parts of Kesteven - - - - -	—	3	3	2	—	2
Monmouth - - - - -	42	51	93	39	42	81
Northumberland - - - - -	2	1	3	2	—	2
Oxford - - - - -	1	5	6	—	2	2
Salop - - - - -	28	13	41	27	21	48
Somerset - - - - -	16	6	22	28	—	28
Stafford - - - - -	1	1	2	6	2	8
Suffolk, Eastern Division - - - - -	—	—	—	1	—	1
Surrey - - - - -	13	—	13	4	—	4
Sussex, Eastern Division - - - - -	1	2	3	3	1	4
Warwick - - - - -	—	—	—	—	1	1
Westmorland - - - - -	31	12	43	37	19	56
Wilts - - - - -	29	23	52	3	11	14
Worcester - - - - -	20	1	21	9	5	14
York, East Riding - - - - -	—	5	5	5	1	6
„ North Riding - - - - -	—	—	—	—	1	1
„ West Riding - - - - -	7	2	9	4	—	4
COUNTY BOROUGHs :						
Canterbury - - - - -	57	5	62	10	6	16*
Newport, Mon. - - - - -	20	46	66	23	38	61
TOTAL ENGLAND - - - - -	354	219	573	281	187	468

* The returns from Canterbury for 1897 were received too late for insertion last year.

COUNTIES REPORTING ANALYSES.	1898. Number of Samples Analysed.			1897. Number of Samples Analysed.		
	Ferti- lisers.	Feed- ing Stuff.	Total.	Ferti- lisers.	Feed- ing Stuff.	Total.
WALES :						
Cardigan - - - - -	17	—	17	8	—	8
Carmarthen - - - - -	4	—	4	4	—	4
Denbigh - - - - -	1	—	1	1	—	1
Flint - - - - -	2	—	2	2	—	2
Glamorgan - - - - -	—	—	—	1	—	1
Montgomery - - - - -	15	—	15	18	3	21
Pembroke - - - - -	10	—	10	3	1	4
TOTAL WALES - - -	49	—	49	37	4	41
SCOTLAND :						
Aberdeen - - - - -	13	2	15	35	5	40
Argyll - - - - -	2	1	3	—	3	3
Ayr - - - - -	42	1	43	29	1	30
Banff - - - - -	3	2	5	2	—	2
Berwick - - - - -	10	1	11	5	—	5
Bute - - - - -	3	1	4	—	—	—
Caithness - - - - -	1	—	1	—	—	—
Dumfries - - - - -	11	1	12	10	—	10
Fife - - - - -	4	1	5	—	2	2
Forfar - - - - -	1	3	4	1	2	3
Kincardine - - - - -	8	—	8	11	1	12
Kirkcudbright - - - - -	19	3	22	19	—	19
Lanark - - - - -	8	—	8	13	—	13
Linlithgow - - - - -	26	5	31	23	3	26
Midlothian - - - - -	19	3	22	21	10	31
Perth - - - - -	96	23	119	79	22	101
Renfrew - - - - -	—	3	3	—	3	3
Ross and Cromarty - - - - -	14	12	26	23	8	31
Selkirk - - - - -	7	8	15	1	3	4
Wigtown - - - - -	8	—	8	6	—	6
COUNTY BOROUGH :						
Greenock - - - - -	—	—	—	—	2	2
TOTAL SCOTLAND - -	295	70	365	278	65	343
TOTAL GREAT BRITAIN	698	289	987	596	256	852

THE GOLDFINCH.

(*Fringilla carduelis*; *Carduelis elegans*, Stephens.)

Naturalists are of opinion that this pretty and harmless bird is gradually decreasing in numbers in this country, and many persons who are interested in wild birds, and who have long been close observers of their movements, say that the Goldfinch is now comparatively rare in many districts. Frohawk remarks that in North Kent, where twenty-five years ago the nest of this bird was not uncommon, it is now hardly ever met with. As one reason for this decrease some say that the enclosure of commons, heaths, and other weed-covered areas has reduced the number of favourite resorts and feeding-places of this bird, and that the seeds of weeds, which constitute its principal food, have become less easily obtainable on account of the improvement of agriculture. Others say that the ruthless bird-catcher, who snares birds, often in spite of the provisions of Acts and Orders, throughout the year, is the real cause of this decrease of Goldfinches, which are highly prized, both as cage-birds and for crossing with canaries, on account of their fine plumage, their song, and their readiness to become tame and to learn tricks, while their peculiar "call-note" makes them useful to bird-catchers as decoy birds. There is also a demand for Goldfinches by bird-stuffers, who arrange them under glass cases as ornaments, for which there is a ready sale amongst certain classes. Their beautiful feathers are likewise largely used for millinery purposes.

Many Goldfinches remain in this country throughout the year, congregating in small flocks during the winter months, pairing and dispersing throughout the country when the

breeding season commences. Some, however, migrate; Seebohm states that some Goldfinches go southwards in the autumn, joining the companies of migrants from Northern Europe that pass these islands, but a considerable number remain throughout the winter. The Goldfinch is found in Scotland and Ireland, though it is there more local and not so generally distributed as in England. It breeds in all European countries; in Norway, according to Seebohm, as far north as lat. 65 deg., but in the Ural mountains only as far as lat. 60 deg. It is also found in the Canary Islands, Madeira, and North-West Africa, and visits Egypt in the winter. This bird is protected in Germany, and highly considered; Ritzema Bos says it is a most valuable bird to agriculturists. The French call it *Chardonneret* because of its fondness for thistles, and it is held by French cultivators to be most useful and in no way injurious to crops of any kind.

The male bird is slightly larger than the female, being about five inches in length. The head is black on the crown, with a band of black reaching half way on each side of the neck, while the nape of the neck is white, and the forehead and throat a lustrous crimson. The upper parts of the body are brown of various hues; the upper tail coverts are greyish-white, and the lower tail coverts bluish-black, with white markings on some of the outer feathers. The wings are blue-black, having broad bars and borders of brilliant golden-yellow. The under part of the body is mostly dull white with brownish and fawn coloured shades, and the legs are of a light red with brown claws. The female has not so much crimson colour on the head and throat, and its colours generally are not so brilliant as those of the male.

The eggs of the Goldfinch, which are usually laid by the 20th of May, are, as a rule, five in number, though sometimes there are only four. They are greenish-white in colour, with purple-brown spots, especially at the upper end. A favourite place for the nest is an apple tree, but several other kinds of trees and bushes are sometimes selected, such as the beech, chestnut, poplar, yew, laurels and other evergreens, shrubs of several kinds, low bushes, and whitethorn hedges.

The nest is cup shaped, and constructed of dried grass, moss, lichens, and fine rootlets, and is lined with feathers, wool, and thistle down. It may be sometimes mistaken for the nest of



the chaffinch, but it is smaller than the latter, though almost equally well made. While in the nest the young birds are fed with insects of many kinds: aphides forming a considerable

part of their food when they can be obtained. In orchards and fruit plantations Goldfinches are particularly useful, as they clear off as food for their young quantities of the Apple Aphis (*Aphis mali*) and of the Apple Sucker (*Psylla mali*), as well as of the destructive caterpillars of the Winter Moth (*Cheimatobia brumata*). After nesting, the Goldfinch feeds upon weeds, weed seeds, and grains. Before the weed seeds are ripe it eats the flower-heads of chickweed, groundsel, and other soft weeds. Afterwards it takes the seeds of thistles of several species and of other plants which have winged seeds, docks, plantains, burdock, dandelions, groundsel, sorrel, chickweed, and of various cruciferous plants, such as charlock, wild mustard, and other objectionable weeds.

In short, the Goldfinch is one of the most useful birds to cultivators ; and it is without doubt, next to the kingfisher, the most beautiful of all British birds, vying in its bright colouring with some of the brilliant species in tropical climates. The necessity of taking steps for the preservation of this useful and harmless bird has been recognised by its inclusion in the schedule of birds protected by the Wild Birds Protection Act of 1880, and, moreover, several local authorities have further protected it by prohibiting the taking and destruction of its eggs.

ANTHRAX.

Anthrax has long been known as a very fatal disease. Prior to the discovery of its cause it was attributed to feeding cattle on highly nutritious or artificial foods, which induced an attack of apoplexy or enlargement of the spleen, resulting in the sudden death of the animal. It is believed that this view as to the cause of anthrax still exists in many parts of the country, for it is a common practice amongst owners of stock, who are unaware of its dangerous and fatal character, to slaughter their cattle as soon as they present serious symptoms of illness, in order to sell the hide or to utilise the carcase for human food. The blood of the diseased animal is, no doubt, in many cases distributed over the floors of the sheds, or upon the mangers, or is carried upon the boots of the attendants, and infects other parts of the farm or premises.

It is important that it should be widely known that the view formerly entertained as to the nature of anthrax is erroneous, and that the disease is entirely due to the introduction into the blood of an animal, or of man, of the minute spores or germs contained within the anthrax bacilli, which are always to be found in the blood of animals recently dead of anthrax. The bacilli of anthrax and the spores therein die speedily if kept within the intact carcase, but multiply with great rapidity if they are exposed to the air.

It will thus be recognised that in order to prevent the extension of anthrax from diseased to healthy animals, or to persons, it is essential that the diseased carcase should not be opened, and that none of the blood or natural secretions

that may contain some blood should escape, as the spores contained within the blood will multiply with rapidity, and when exposed to the air may become the means of infecting other animals.

In most instances, the first intimation of an outbreak of anthrax or splenic-fever is the discovery of a dead animal in the pasture or byre. Perhaps the animal was left a few hours before in apparent health; at least, there was nothing to attract attention, or give any warning of the near approach of death. Occasionally there are certain premonitory symptoms of an attack of anthrax which can be recognised by an expert. The affected animal is dull, and disinclined to move. If one of a herd at pasture is attacked the fact is indicated by the separation of the sick animal from the rest. From time to time the animal will cease to feed, and stand with the head bent towards the ground, and sometimes a little blood is discharged from the nose and also with the fæces. Close attention will enable the observer to detect an occasional shiver, with trembling of the limbs, which seems to pass rapidly over the body, and then ceases. The shivering fits now become more frequent, and perhaps, while these signs are being noted, the animal will suddenly roll over on its side, and, after a few violent struggles, expire. On close inspection, especially in the case of swine, it will often be found that there is a good deal of swelling under the throat, extending down the neck; and the swollen part will at first be hot and tender to the touch, but as the disease goes on it becomes insensitive, cold, and clammy.

Although a communicable disease, anthrax is not transmitted from the living diseased animal to the healthy by association, as in the case of cattle plague, foot and mouth disease, or other animal diseases of a contagious nature, but is almost invariably transmitted to the healthy animal through the medium of food or water containing the spores of the disease. These spores may also find their way into the circulation through a cut or abrasion. The disease may be introduced through the spreading of infected manure on the pastures, and occasionally outbreaks have been directly

traced to the distribution upon the farms of manure containing the cuttings or scrapings of hides.

In their own interest owners of stock should permit their animals when affected with anthrax to die, rather than slaughter them in the ordinary way, and thus infect their sheds, stock-yards, and other parts of their farms and premises, and possibly cause the death of those persons who may be engaged in slaughtering them.

It will be gathered from the preceding remarks that, since the means by which anthrax may be spread are different from those of other contagious diseases of stock, the measures to be adopted for preventing its extension should also be dissimilar.

Whenever an animal with suspicious symptoms during life dies suddenly from some unaccountable cause, the fact should be at once reported to the Local Authority, and the owner should forthwith plug the nostrils and all the natural openings with hay or tow saturated with a strong solution of carbolic acid, to prevent the oozing of any blood therefrom. The Veterinary Inspector should at once inquire as to the cause of death, and determine by careful investigation whether anthrax exists or not. This can be done soon after death by examining with a microscope a few drops of blood taken from one of the superficial veins.

It having been decided that the disease to be dealt with is anthrax, the owner should cause all the cattle, sheep, or swine that have been in association with the dead animal, and are pronounced by the Veterinary Inspector to be apparently healthy, to be moved as soon as possible from the shed or field or other place where the disease has originated, to some other place on the farm or premises, there to be isolated. These animals should be given an entire change of food and water, and as the period of incubation of anthrax is usually very short, isolation for seven days will usually be sufficient to enable the Veterinary Inspector to determine whether any of these animals are infected or not.

For the burial of the carcase some part of the farm should be selected which is remote from any watercourse, and to

which animals cannot or do not ordinarily have access, such as a wood or enclosure. The burial and disinfection of the carcase will be carried out under the supervision of an inspector of the Local Authority.

The inspector of the Local Authority should then carry out or supervise a rigid system of disinfection of the place or premises where the diseased animal has been detained or has died, and of all manure and broken fodder remaining therein.

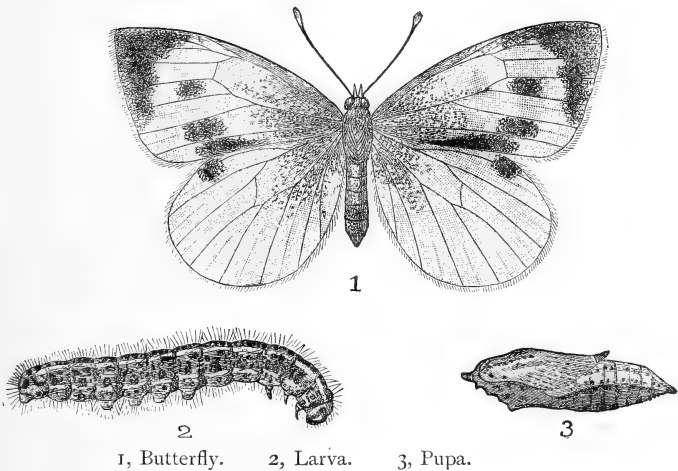
The main cause of the periodic recurrence and persistence of anthrax on many farms in this country has no doubt been due to the skinning of the diseased carcasses and to the want of proper precautions for their burial and disinfection. The most effectual manner of destroying the germs of anthrax is by burning the carcase, or by destroying it by means of chemical agents; and when facilities exist for carrying out either of these methods a licence of the Board must be previously obtained. In cases where burial is adopted every facility should be afforded by the owner to the inspector of the Local Authority in order that this duty may be effectually carried out.

It has been found by experience that where all the above-named precautions have been scrupulously adhered to, the disease frequently ceases after the death of one animal on the farm.*

* Copies of this article may be obtained free of charge and post free on application to the Secretary, Board of Agriculture, 4, Whitehall Place, London, S.W. Letters of application so addressed need not be stamped.

THE LARGE WHITE BUTTERFLY.

(*Pieris brassicæ*.)



Although the injuries that are caused by the caterpillars of this large butterfly are far more frequently noticed in market gardens and private gardens than in fields, it sometimes happens that considerable harm is caused by them to field cabbages, thousand-headed kale, rape, and turnips, especially in fields near the sea and in small enclosures surrounded with hedgerows. In seed-growing districts, as, for example, in Romney Marsh in Kent, and in parts of Essex, Lincolnshire, and other counties where cabbage, turnip, rape, and mustard seeds are largely grown, the larvæ of the large white butterfly attack and devour the seed pods and diminish materially the crops of seed. Cabbages of all kinds, Brussels sprouts, broccoli, cauliflowers, and kale are also often attacked by these caterpillars, which are so large

and voracious that a few of them quickly clear off the leaves, while the hearts and other parts of the infested vegetables are spoiled by their excrement, and by the decomposing bodies of caterpillars which have been killed by the parasites which frequently infest them.

In some seasons, particularly in times of drought and heat, these caterpillars are very numerous and destructive, but their ravages are speedily checked by wet weather. In the hot dry summer of 1898 they were observed in great abundance near Hastings, Lewes, Eastbourne, and Brighton, and all along the south-eastern coast, as well as in other places by the sea. The injuries caused were very noticeable in fields and gardens in these localities throughout the latter part of the summer, and during the very dry weather in September and the early part of October they fed unchecked. But the heavy rains which fell on the 19th and 21st of October killed the greater number of these caterpillars, though some were found as late as November, together with the much smaller green caterpillars of the small white butterfly (*Pieris rapæ*).

In addition to the considerable numbers of the large white butterfly which are bred in this country, there is in some seasons a large immigration from the Continent. Immigrations also occur in Continental countries, notably in Belgium, Germany, and Holland, swarms of these butterflies being carried from their breeding places by breezes from the opposite shores.

No special immigration of this insect was, however, noticed in 1898. The unusual attack was due to the abnormally dry season, which favoured its increase, so that in some cases there were three generations during the summer and autumn. In several places large white butterflies were seen at the end of October.

Life History.

This butterfly is found throughout the United Kingdom (except in the Shetland Isles) and in most of the temperate regions of the world. It is rather more than an inch in length, with a wing expanse of nearly $2\frac{3}{4}$ inches, the female being slightly larger than the male. The wings are wide

and creamy white with black shades on the upper margins. On the forewings of the female there are two black spots on the outer part of each; below the lower spot there is a narrow stripe of black on the lower margin, and a black spot near the upper margin of each hind wing. The male has no black spots on the upper side of the forewings, but in both sexes there are black spots on the under side of the forewings near the centre. The antennæ have distinct black clubs.

The perfect insect appears in May, early or late according to the season. Flask-shaped eggs, of a dull yellow colour, are laid in groups on either side of the leaves of various cruciferous plants, such as cabbages of all kinds, and on weeds like charlock, hedge mustard, and several others. The greater part of the first brood is probably bred upon wild plants and weeds; and, if the weather is suitable, the second brood, which appears in July, is bred upon cruciferous plants cultivated in fields and gardens. The first brood or generation is over by the beginning of July, and the second, which is the most dangerous and destructive, continues to the end of September, in normal conditions; but occasionally, as in 1898, butterflies of a third generation are found. Taschenberg states that butterflies of the third generation sometimes produce caterpillars in dry and suitable weather.

The eggs, which are generally laid in May, though they have been found in April in very early seasons, are hatched, as a rule, in about eleven days. The caterpillar is pale green at first and about one-twelfth of an inch long, with a black head. When full grown it is an inch and a half long, cylindrical in shape, narrower at the head and tail ends than in the middle of the body. In colour it is bluish green, with grey shades mingled with yellow. Its dorsal and spiracular lines are yellow, and the wider part of the body is greenish. There are short white hairs upon the body. The head is slate coloured, with black dots upon it, and the legs are yellow, with dark markings.

In ordinary conditions the caterpillar feeds for about twenty-one days, and pupates, in the first generation, either on the plant on which it is feeding, or it crawls away to pupate upon palings, branches and stems of trees, walls, sides of lodges

and other buildings, and the sides of banks, rocks, and cliffs. The pupa or chrysalis is slightly more than an inch long. It is usually pale green in colour, with very small black dots all over it. Sometimes it is bluish green, shaded with yellow. The pupal state continues for about thirteen days.

The butterflies of the second generation lay their eggs in the first weeks of July, when there is a wide choice of cultivated cruciferous plants in the field and garden. From these eggs the caterpillars are hatched in seven or eight days, and their depredations may be most serious if the climatic conditions are favourable. When the caterpillars are full fed in ordinary seasons they crawl away and become chrysalids in the situations already described, where they remain until the following spring. As has been stated above, a third brood of butterflies is sometimes produced in favourable circumstances, but this is exceptional.

Modes of Prevention and Remedies.

If careful attention is given in June to plants infested with these caterpillars a much more serious attack may be prevented from the succeeding generations. Most of the cultivated plants of the *Brassica* group are then small, and may be hand-picked in market gardens, gardens, and allotments, or syringed with water, or dusted with lime and soot. In fields, they may be dusted with lime and soot by means of a horse distributor. The outsides of fields near infested crops should be kept clear of weeds. In market gardens, gardens, or allotments, the woodwork of open lodges, sheds, and other outbuildings should be brushed down and the walls well lime-washed in order to dislodge the chrysalids. Dusting infested plants with lime and soot is a good remedy. The mixture should be composed of three bushels of lime and one of soot, very finely powdered, and applied with a hand-dusting machine in gardens and allotments, and a distributor in market gardens and fields. Distributing by hand would serve in gardens, allotments, and small patches of plants. Hedge-rows and the sides of hedges should be brushed in the winter and the rubbish burned.

In America attacks of a similar butterfly are successfully

remedied by spraying with Paris Green solutions, in the proportion of 1 lb. of Paris Green to 150 gallons of water. The objection to this treatment is the possibility that the cabbages and other plants intended for the food of man or beast might retain the poison, though the Americans use Paris Green freely upon this and many other kinds of food plants.

Fortunately, heavy showers and wet weather check the progress of these caterpillars. There are, besides, several parasites, the larvæ of species of the *Ichneumonidæ*, which feed upon the caterpillars and chrysalids. The larvæ of one of these, termed *Apanteles glomeratus*, are very destructive to the caterpillars in some seasons, devouring the contents of their bodies and filling them with groups of yellow cocoons. Another larger species of Ichneumon fly lays an egg in the chrysalids of this butterfly, and thus destroys its vitality. Birds are also most useful in reducing the numbers of this insect. Titmice carry off the larvæ to their young, and with their sharp eyes detect the chrysalids in their winter quarters, and quickly destroy them. The hedge-sparrow (*Accentor modularis*) takes these caterpillars in their early stages, and the blackbird and starling clear them off with avidity.

INDIAN AGRICULTURAL EXPORTS.

In the "Review of the Trade of India in 1897-8"*, the Officiating Director-General of Statistics to the Government of India states that the conditions prevailing during the financial year ending March 31st, 1898, were disastrous to the export trade, which showed a decrease of more than 6 per cent., following a fall of nearly 9 per cent. in the previous year. The decline was largest in Bombay, which suffered from a recrudescence of the plague in the latter half of the year. The failure of the crops in 1896 had a most prejudicial effect on the export season of 1896-7, the latter part of which fell within the period under review, and the continuance of widespread distress and famine prices until the harvesting of the autumn crops restricted the export of rice and other food grains.

In the following list are shown the principal articles of agricultural produce exported from India:—

Exports.	1893-4.	1894-5.	1895-6.	1896-7.	1897-8.
	Thousands of Cwts.	Thousands of Cwts.	Thousands of Cwts.	Thousands of Cwts.	Thousands of Cwts.
Wheat - - -	12,157	6,888	10,003	1,911	2,393
Rice - - -	24,020	33,722	34,636	27,820	26,272
Tea - - -	1,128	1,153	1,230	1,330	1,352
Coffee - - -	279	281	291	211	225
Sugar, raw - -	1,151	958	1,022	1,097	549
Seeds - - -	24,229	20,887	13,672	11,398	12,553
Oil cake - - -	470	462	558	603	415
Manures - - -	1,028	1,595	1,588	1,526	1,453
Rice-bran - - -	1,203	1,901	1,840	2,048	2,370
Indigo - - -	131	166	187	170	134
Cotton, raw - -	4,789	3,385	5,248	5,216	3,723
Jute, raw - - -	8,690	12,977	12,267	11,464	15,023
Wool - - -	217	278	277	254	276

* C.—9120.—Price 2s.

The collapse in the wheat trade in the second half of 1896-7 continued through the first half of the following year. The harvest of 1896-7 was below the average, and with the general prevalence of distress, prices ruled abnormally high. A brisk revival of the trade began in March, 1898, and since then, with a crop estimated at 33 per cent. above last year's yield, the trade has been active again. The value of the wheat exported was higher than in the previous year, the totals in 1896-7 and 1897-8 being *Rx* (*i.e.*, tens of rupees) 836,000 and *Rx* 1,341,000 respectively. The high price of wheat caused a decline in the exports of flour, which fell from 600,000 cwts. in 1896-7 to 505,000 cwts. in 1897-8. Flour is sent chiefly to Mauritius, Aden, Arabia, Ceylon, and Zanzibar.

Rice, of which two-thirds goes from Burma, was exported in slightly smaller amount than in 1896-7, the decrease being 1,550,000 cwts. The crop of 1896 is reported to have been very deficient in Bengal and Madras, and a large part of the surplus of the Burma crop was diverted to these provinces to supplement the deficiencies in the food supply. Under the influence of a good monsoon the yield in 1897 was abundant, being more than double the previous year's yield, and 20 per cent. above the average. The surplus in Burma was the largest on record, but the demand from the distressed tracts of India continued unabated during the first six months of the year. Rice is chiefly exported to Egypt (8,125,000 cwts. in 1897-8), after which the largest quantities were taken, in the year under review, by Ceylon, the Straits, the United Kingdom, and South America, in the order named.

Hides and skins show a considerable increase, the total number of raw hides exported being 10,072,000 (an increase of 2,645,000), and of skins 9,842,000 (or 3,500,000 more than in 1896-7). The total increase in value, from *Rx* 3,235,000 to *Rx* 4,494,000, was the largest individual increase in the export trade of the year. There were, in addition, tanned hides and skins exported to the amount of 366,000 cwts., of the value of *Rx* 3,823,000. The improvement is attributed partly to the abatement of the plague at Karachi and the withdrawal of the prohibition imposed by foreign countries on the importa-

tion of hides, and partly to the plentiful supply provided by a year of drought and famine.

The trade in seeds showed an improvement in 1896-7, but still remained at a low ebb, the seasons having proved unfavourable. The exports of linseed, which were over ten million cwts. in 1893-4, fell to 4,683,000 cwts. in 1897-8. There was a large increase in rape and sesamum, the exports of the former attaining a total of three and a half million cwts., and of the latter two million cwts. Earth-nuts have fallen from over a million and a half cwts. in 1893-4 to 45,000 cwts. only in 1897-8, the decline occurring in the exports to France, and being attributed to the employment by soap-boilers of cotton-seed oil as a substitute for ground nut oil.

An important trade is done in oils—chiefly castor and cocoanut—1,954,000 gallons of the former and 1,046,000 gallons of the latter being exported in 1897-8. Both show a decline during the last two or three years, due to unfavourable seasons.

The exports of tea (151,452,000 lbs.) were about two and a half million lbs. more than in the previous year, but the value declined somewhat, being *Rx*8,059,000, as against *Rx*8,125,000 in the earlier year.

Among other exports, coffee shows a small increase in quantity, but a decline in value, while the production of sugar was affected by the drought. The area sown with cotton was about one million acres below the average, the decrease being due in part to the substitution of food grains. Jute, in spite of the quantity exported being the largest on record, and 31 per cent. more than in 1896-7, showed a fall in total value from *Rx*10,551,000 to *Rx*10,130,000. The rice-bran is the produce of the mills in Burma; and the manures consist almost entirely of animal bones. There was a brisk demand for teak, and largely increased quantities (81,866 cubic tons, as against 64,221 in 1896-7) were shipped to the United Kingdom, Ceylon, and Egypt. The trade in wool revived somewhat; the United Kingdom has practically a monopoly of this trade, but exports to Japan increased by 77 per cent.

IMPORTATION OF DOGS INTO GREAT BRITAIN.

The Board of Agriculture have issued the following memorandum as to the conditions which have been prescribed in order to prevent the introduction of rabies :—

1. The disease of rabies in dogs and of hydrophobia in man, which remains prevalent in almost all other parts of the world, has become practically extinct in this country, but as it may remain latent in a dog for a very long period it has become necessary, in the interests of owners of dogs in this country, to adopt precautions against the reintroduction of the disease by means of dogs which may, unknown to their owners, have become infected whilst in a foreign country.

2. The Importation of Dogs Orders, therefore, prohibit the introduction of dogs into Great Britain from any foreign country or British possession, other than the Channel Islands, without the sanction of the Board of Agriculture; and the landing of a dog from abroad (whether originally exported from Great Britain or not) will, unless a licence has previously been obtained, render the owner liable to a penalty of £20 and the possible seizure of the dog.

3. Every person wishing to introduce a dog into Great Britain must, before the dog is embarked, obtain a licence permitting the landing of the dog on arrival; and the attention of owners, charterers, and masters of vessels carrying dogs is drawn to the fact that by permitting the landing of such dogs from their vessels without the requisite licences they render themselves liable to legal proceedings.

4. Every application for a licence for landing a dog should be made in writing, on a form which will be supplied to *bonâ fide* applicants. It must be signed by the owner of the dog, or by his agent specially authorised in writing for the

purpose, and should be sent to *The Secretary, Board of Agriculture, 4, Whitehall Place, London, S.W.*, in sufficient time to enable the Board to make full inquiries into the circumstances of the application, and the suitability of the proposed premises for the isolation of the dog, and to communicate to the owner their decision before the embarkation of the dog is to take place.

5. In order that the Board may have it on record that the conditions on which alone a licence can be issued are fully known by the owner of the dog (or the person, if other than the owner, in whose charge it is to be detained), the signature of the owner or of the proposed custodian of the dog is to be subscribed to the undertaking printed on the back of the form of application. The signature of an agent cannot, in any case, be accepted as sufficient, unless he is prepared personally to undertake the charge of the dog during the whole period of detention.

6. In very exceptional cases the Board are prepared to entertain applications made by telegram, on the following conditions:—

- (a) The telegram must set forth the description of the dog, stating as far as possible for purposes of identification the particulars of its breed, sex, age, and colour, and the place where it is proposed that the animal should be detained.
- (b) The place of detention must be the residence of a householder, or other responsible resident of long standing, in Great Britain, who is prepared to detain the dog on the premises for not less than ninety days in accordance with the conditions of the licence; and the full name and address of the person must be given, so as to enable the Board, before the licence is issued, to place themselves in communication with him to ascertain whether he is in a position to fulfill the requisite conditions.
- (c) An address must also be named in the telegram to which the Board can send the licence if issued, or otherwise communicate their decision to the applicant. This should be some place in the country of

embarkation, as shipowners cannot properly permit the embarkation of any dog on board their vessels for importation into this country unless the dog is accompanied by the requisite licence.

- (d) The telegram should contain the undertaking of the owner to carry out the conditions imposed.

7. The conditions imposed in the licence require the detention of the dog for a period of six months on some suitable private premises to be specified by the owner, and approved by the Board, where the dog will be under the supervision of the officers of the Board and of the local authority, for whose inspection it should be produced if required. But if the general conditions imposed are properly carried out, the Board are prepared, on the production of a certificate of a duly qualified veterinary surgeon that the dog is not affected with or suspected of rabies, to consider applications for the release of the dog after a period of detention of ninety days. Dogs which have been recently purchased from foreign dealers, or of which the antecedents are unknown, will be subjected to special restrictions and a longer period of detention.

8. The owner's private place of residence is regarded in most instances as a suitable place of detention.

9. Hotels, barracks, or other similar premises where the dog cannot be conveniently isolated, are not regarded by the Board as suitable places of detention.

10. On arrival at a port in Great Britain, and before the dog can be landed, the holder of the licence is required to produce it for the inspection of the officer of Her Majesty's Customs, who is empowered and directed to mark it with the name of the port, the date of landing, and his initials, as a verification of the legality of the landing.

11. The dog must be taken as soon as it is landed, by the nearest available route, and without unnecessary delay, to the premises specified in the licence.

12. In the case, however, of dogs landed late in the day, and where the place of detention is several hours' journey from the port, the Board do not object to the journey of the dog from one place to the other being broken by its detention at some suitable place for one night only, provided that it is

kept absolutely apart from all other dogs, and that the journey is resumed the next day and completed with all reasonable dispatch.

13. In every case the licence should accompany the dog on its journey, and be retained by the person in charge until it is required to be returned to the Board.

14. It should be clearly understood that the dog cannot in any case be moved from the place of detention, either to other premises or to a vessel for exportation out of the United Kingdom, without a further licence from the Board; but should exceptional circumstances arise which render such removal necessary or expedient, the Board are prepared to consider an application for a licence, provided that they are satisfied by the production of a certificate of a duly qualified veterinary surgeon that the dog is not affected with or suspected of rabies. When the proposed removal is to some other place in the United Kingdom, a suitable place must be specified where the dog can be kept for the remainder of the period of detention.

15. During the period of detention the dog, when temporarily moved for exercise or other like purpose from the place of detention, must be in charge of a competent person, and be properly muzzled with a wire cage muzzle, and this latter condition is also applicable when the dog is likely at any time to be brought into contact with other dogs.

16. Should the dog die, or be lost, the fact should be at once reported to the Board, together with full information as to the symptoms preceding death, or the circumstances under which the loss took place; and in the event of the dog sickening with any of the symptoms of rabies it should be at once isolated, and the advice of a veterinary surgeon obtained.

17. Licences to which special conditions are attached are issued by the Board to land *bonâ fide* performing dogs, if it can be shown that the dogs have been trained to take part in performances for the entertainment of the public, and that they are to be imported for that purpose only. In such cases satisfactory evidence must be offered that the animals are habitually kept absolutely apart from all other dogs, whether

in this country or abroad and a place must be specified where the dogs can be examined, if thought necessary, after being landed.

18. For the convenience of persons passing through Great Britain the Board are also prepared, in special cases, to authorise the landing of dogs which are proposed to be exported within a few days. In making an application for such a licence, the ports, the names of the vessels, and the dates of arrival and departure must be specified, and the address of some suitable place where the dog can be detained during the period that it remains in Great Britain, which must not exceed ten days. The licence in this case should be endorsed by an officer of the vessel of departure, and returned to the Board by the owner, and the dog must not be again landed in Great Britain without a further licence.

[Copies of this memorandum may be obtained on application to the Secretary of the Board of Agriculture, 4, Whitehall Place, S.W.]

BELGIAN AGRICULTURAL INQUIRY OF 1895.

The statistical results of the general agricultural census taken in Belgium in 1895 have recently been published. This return is of special interest, as no official estimate of the area under the various crops had appeared since 1880, fifteen years previously, although statements showing the estimated yield per acre of certain crops in Belgium have been annually published by the Ministry of Agriculture and Public Works.

The total land returned as agricultural (*exploité*) in 1895 is 6,440,560 acres. This shows a decrease of about 240,000 acres since 1880, when the area was returned at 6,681,244 acres. Of the total, however, heathlands and similar areas not regularly utilised account for 418,243 acres, against 572,951 in the earlier year; while wood-lands have increased by nearly 80,000 acres (from 1,208,880 to 1,288,093 acres). The more important modifications in the distribution of the crops and grass in Belgium will be best illustrated by the following table, which groups together as far as possible the various products of the soil:—

Crops	1895.	1880.	Increase or Decrease.	
			Total.	Per Cent.
	Acres.	Acres.	Acres.	
Cereals and pulse - -	2,064,959	2,390,357	- 325,398	- 13·6
Potatoes - - -	456,187	492,412	- 36,225	- 7·4
Roots - - -	132,889	89,298	+ 43,591	+ 48·8
Industrial crops - -	261,180	238,934	+ 22,246	+ 9·3
Clover, grasses, etc. -	1,575,630	1,419,954	+ 155,676	+ 11
Other crops - -	166,525	164,713	+ 1,812	+ 1·2
Bare fallow - -	76,854	103,745	- 26,891	- 25·9
Total cultivated area	4,734,224	4,899,413	- 165,189	- 3·4

The broad feature of the change has thus been a decrease in the cultivation of corn; the enlarged area under grass has, however, not compensated the diminished acreage under cereals, and as a net result the whole cultivated area has suffered a reduction of 165,000 acres, or $3\frac{1}{2}$ per cent.

Considering more in detail the individual crops which have been grouped together in the above table, it should, in the first place, be remarked that the new returns effect very considerable alterations in the total production of the crops as hitherto published; not only because the areas hitherto assigned to each kind of produce have been completely modified, but also because the new returns show that the estimates made in 1895 of the amount produced per acre require amendment. In this census a return of the total quantities raised was demanded, and the yield per acre was then obtained by dividing the total production by the area. As an instance of the difference made it may be mentioned that the yield of wheat in 1895 was at the time given as 26·8 bushels per acre, while the complete returns now show it to have been just 28·66. In the subjoined tables, comparing the areas under different crops in 1895 and 1880, the figures of production have therefore been added. The particulars for the chief cereals and pulse are as follows:—

Crops.	Area.		Production, 1895.	
	1895.	1880.	Per Acre.	Total.
	Acres.	Acres.	Bushels.	Bushels.
Wheat - - - -	445,531	681,552	28·7	12,769,264
Spelt - - - -	83,619	129,710	21·4	1,789,744
Rye - - - -	699,939	685,771	26·5	18,550,640
Barley - - - -	99,400	99,247	38·2	3,805,838
Oats - - - -	614,274	616,230	40·2	24,675,120
Beans - - - -	39,433	47,147	28·6	1,126,236
Other cereals and pulse -	82,763	130,700	—	—
Total - - - -	2,064,959	2,390,357	—	—

The area under wheat has thus undergone a contraction of over a third, and that under spelt the same; while pulse has also considerably diminished. The other cereals do not

exhibit any material change, although a slight extension appears in 1895 in the cultivation of rye.

Potatoes show a decline in acreage of about 36,000 acres. The yield of this tuber in 1895 is returned at $5\frac{3}{4}$ tons per acre, and the total production at 2,632,900 tons.

Details of the industrial crops show that, although the total area under this group has been augmented by less than 10 per cent., material alterations have taken place since 1880 in the classes of plants which it has apparently been found most profitable to grow. The area under sugar-beet is larger by two-thirds, the increase being over 50,000 acres; the progress since 1866, when the area was little more than half that of 1880, being thus continued. Tobacco has increased by nearly 36 per cent., and chicory (for coffee) by 16 per cent. On the other hand, the area under flax, almost all grown in the two provinces of Flanders, which are watered by the Lys, has lost 23,000 acres, or 24 per cent. As the area under this fibre declined by nearly 42,000 acres between 1866 and 1880, it appears that it occupies now but little more than half the extent that it did thirty years ago. Oleaginous plants—such as rape and colza—have nearly disappeared, the decline in acreage being over 70 per cent. The small area under hemp has also been contracted by a quarter. The details of these industrial crops are as follows:—

Crops.	Area.		Production, 1895.	
	1895.	1880.	Per Acre.	Total.
	Acres.	Acres.	Cwts.	Tons.
Hemp - - - -	1,509	1,988	7·6*	573*
Flax - - - -	75,618	98,993	4·1*	15,577*
Colza, rape, and other oleaginous plants - -	4,463	15,899	12·4	2,776
Tobacco - - - -	5,306	3,895	16·9	4,479
Hops - - - -	9,152	10,337	10·5	4,189
			Tons. Cwts.	
Chicory - - - -	31,507	27,233	9 17	309,611
Sugar-beet - - - -	133,625	80,589	12 12	1,684,301
Total - - - -	261,180	238,934	—	—

*Fibre. The yield of flax seed was 381,081 bushels, or 5·04 bushels to the acre.

Roots in Belgium appear to be mainly considered as second or catch crops, except in the case of mangolds. Of the latter there were 100,186 acres in 1895, an increase of 15,502 acres, or more than 50 per cent. in fifteen years. The production amounted to 1,781,914 tons, or 17·8 tons per acre. Under carrots and parsnips (as main crop) 9,453 acres yielded 12,194 tons (8·7 per acre); and 23,250 acres of turnips, swedes, cabbages, etc. (also as main crop) produced 198,604 tons (8·5 per acre).

The following table shows the distribution of the various grasses and leguminous plants classed as green fodders, and indicates a large increase in the acreage under grass, whether for hay, for pasture, or in orchards; while clovers apparently show some little decline:—

Crops.	Area.		Production, 1895.	
	1895.	1880.	Per Acre.	Total.
	Acres.	Acres.	Tons. Cwts.	Tons.*
Red clover - - -	243,801	277,848	9 6	2,271,417
<i>Trifolium incarnatum</i> -	37,262		7 6	273,315
Other clovers - - -	108,171	119,383	—	—
Lucerne - - -	39,762	33,217	10 7	441,849
Sainfoin - - -	18,127	14,585	6 5	113,407
Grass, for hay - - -	573,374	526,792	1 7	1,510,566
„ „ grazing - - -	408,185	340,561		
Orchards - - -	117,550	93,729	—	—
Rye-grass - - -	21,805	9,845		
Fodder - maize and serradella - - -	7,593	3,994	—	—
Total - - -	1,575,630	1,419,954	—	—

It would seem that the yield attributed to the clovers, lucerne, and sainfoin is to be considered not as dry hay, but as representing the weight cut. In addition to the 27 cwts. of hay per acre, the grass land is credited with a subsequent return of 12½ cwts. per acre. Since the volumes of the census at present available comprise only statistical tables, it is not possible to say what, if any, allowance has been made on account of pasture grazed in estimating the production of hay.

The most important areas included among “other

crops" are those occupied as market gardens (103,414 acres in 1895; 98,118 acres in 1880). Nurseries have increased by some 1,400 acres, and now comprise 7,472 acres; parks and pleasure-grounds accounted in 1895 for 38,843 acres, as compared with 29,126 in 1880. Osier beds—8,269 acres—have diminished by just a quarter; while the 500 acres of vineyards reckoned in 1880 have been reduced to a bare 170.

The inquiry extended also to second or catch crops, which are of importance, as most of the roots appear to be considered in this light. The area devoted to catch-crops, and already included in the total as producing some or other of the above-mentioned plants, was 473,776 acres in 1895. Nearly three-fourths of this (338,296 acres) was devoted to turnips; another 41,496 acres to carrots, and 65,589 acres to spergula. These areas exhibit little change since 1880. The yield of roots is lower than when these varieties are grown as main crop, amounting to 2,526,095 tons of turnips and 189,505 tons of carrots, or at the rate of 7 tons 9 cwts. and 4 tons 11 cwts. per acre respectively. Of spergula the yield was 325,513 tons (just under 5 tons per acre).

The minor catch-crops exhibit considerable increases since 1880, there being in 1895 over 11,000 acres utilised for rye cut green, 6,600 acres for lupins and other plants for green manuring, besides about 10,500 acres of miscellaneous crops. All these were included in 1880 under the one heading of miscellaneous, then accounting for about 12,000 acres; but there were in addition at the earlier date some 33,000 acres under *Trifolium incarnatum*, and it appears possible that this variety has in 1895 been transferred to the main crops, so that the apparent decrease of about 10,500 acres in the total land under catch-crops during the period may be more than accounted for by a change in classification.

The table on the next page shows the number of live stock in Belgium at the last three enumerations.

It appears that there is in cattle an increase; due, apparently, to a large stock of young cattle, while oxen of two years and over show a decline. The diminution in the flocks of sheep is large, and follows a heavy fall in the

period 1866-80. The pigs, on the other hand, show an important gain. Statistics of bees show that 107,790 hives were enumerated, an increase over the number in 1880 (97,037); but 140,632 hives were returned in 1866.

Live Stock.	1895.	1880.	1866.
Cattle :	Number.	Number.	Number.
Under 2 years : Bulls - - -	65,067	49,707	—
Oxen - - -	102,398	89,316	—
Heifers - - -	382,332	365,445	—
Total under 2 years - - -	552,337	504,468	452,211
2 years and over : Bulls for breeding-	10,668	9,660	—
Oxen - - -	55,702	72,509	—
Cows - - -	802,271	796,178	—
Total 2 years and over - - -	868,641	878,347	790,234
Total cattle - - - - -	1,420,978	1,382,815	1,242,445
Horses - - - - -	271,527	271,974	283,163
Sheep - - - - -	235,722	365,400	586,097
Swine - - - - -	1,163,133	646,375	632,301
Asses and mules - - - - -	6,915	10,120	11,849
Goats - - - - -	241,045	248,755	197,138

AGRICULTURAL AND MISCELLANEOUS NOTES.

AGRICULTURAL WAGES IN 1897 AND 1898.

The *Labour Gazette* for February contains a report by the Agricultural Correspondent of the Labour Department of the Board of Trade on the wages of agricultural labourers in 1897 and 1898. The report is based on information received from a large number of chairmen of District Councils in England, and also from a number of other correspondents, as to the rates of weekly cash wages in 249 Poor Law Unions paid to ordinary agricultural labourers (men not exclusively engaged with the charge of animals, such as shepherds, cattlemen, carters, and wagoners), exclusive of piece work earnings and of all extra allowances in cash or kind, in December, 1898, compared with December, 1897.

The general effect of the returns is to show that there has been an upward movement in agricultural wages.

It has been assumed, for the purposes of calculation, as on former occasions, that where the predominant rates of wages of ordinary labourers have changed in a district, a similar change has taken place in the wages of all classes of agricultural labourers. Although, strictly speaking, this assumption is not absolutely correct in all counties, it may be said that the wages of men in charge of horses, cattle, and sheep, roughly follow the movement in the wages of the ordinary labourers, though the changes are not necessarily of the same amount, nor do they always take place at the same time.

The following table shows the changes of wages of agricultural labourers in certain Poor Law Unions in the Midland, Eastern, Home, and Southern and South-Western Counties between the end of 1897 and the end of 1898

Changes in the Winter Rates of Agricultural Wages.

DISTRICTS.	No. of Poor Law Unions reported on.	Number of Agricultural Labourers in 1891 in Unions in which there has been the under-mentioned rise in the weekly rates of Wages of Agricultural Labourers in the winter of 1898, as compared with the winter of 1897.					
		No change.	Increase per Week of				Total.
			6d.	1s.	1s. 6d.	2s.	
Midland Counties...	71	80,930	302	13,579	1,016	1,063	96,890
Eastern Counties ...	47	34,878	—	61,715	14,941	1,942	113,476
Home Counties ...	37	35,623	948	18,995	3,373	—	58,939
Southern and South-Western Counties ...	94	95,673	—	14,851	—	—	110,524
Total ...	249	247,104	1,250	109,140	19,330	3,005	379,829

It will be seen from this table that, out of a total of 379,829 agricultural labourers in the districts named, 132,725 (or 34·9 per cent.) were in Poor Law Unions in which wages rose, the increases varying from 6d. to 2s. a week. The predominant rise (in unions where any change took place) was 1s. per week; but the average rise, spread over the whole number of labourers included in the returns, was about 4½d. a week.

The greatest number of changes took place in the corn-growing counties of Cambridge, Essex, Lincoln, Norfolk, and Suffolk. Out of a total of 132,725 agricultural labourers in unions in which wages were changed in all the districts referred to, 78,598 (or 59·2 per cent.) were in these five Eastern counties, forming nearly 70 per cent. of all the labourers, covered by the returns from those counties. Of the 61,715 labourers in unions in the Eastern counties in which the rates of wages were generally increased by 1s. per week, 24,246 were in Suffolk, 16,274 in Norfolk, 14,007 in Essex, and 7,188 in Cambridgeshire. The increases of 1s. 6d. per week were chiefly in Lincolnshire.

In a considerable number of cases the increase in the rate of wages in December, 1898, compared with December,

1897, was due to a rise taking place in the summer of 1898 without a subsequent reduction in the winter.

The Northern counties have been excluded from these calculations, as the greater number of labourers there are hired by the year or half-year. Wages in these counties during 1898 were well maintained, and at some of the hiring fairs there was an upward tendency.

EFFECT OF CONCENTRATED FOODS ON THE PRODUCTION OF MILK.

In an earlier number of this Journal* an account was given of the results of an experimental inquiry, carried out by Mr. John Speir on behalf of the Highland and Agricultural Society, to ascertain the effects produced by various kinds of what are known as "concentrated" foods upon the milk yield of cows, and upon the butter manufactured from the milk of cows which received such foods. The foods employed in this investigation included vetches, maize, beans, Paisley meal, oats, linseed and cottonseed cake, grey peas, sugar-meal, meat-meal, brewers' grains, and a mixture of grains, bran, treacle, and potatoes. A detailed statement of the observations made during the course of the inquiry will be found in the Annual Report of the Board of Agriculture on the Distribution of Grants in Aid of Agricultural Education for 1896-97 (C. 8,690). The principal conclusions deduced were that rations with a very high albuminoid ratio seemed to have a depressing effect on the milk yield, and that, provided extremes be avoided, the dry matter in the food seemed to be the chief controlling factor in the production of milk or increase of live weight, and was of greater importance than the albuminoid ratio. It was also found that every food when first given seemed to have more or less effect in increasing or decreasing the percentage of fat in the milk; but that this effect was transitory, and that the milk returned to its normal composition about the end of the fifth week—

*Vol. IV. No. 3, December, 1897, page 347.

brewers' grains in the wet state and in excessive quantity were, however, excepted from this general statement. The decrease per cent. in the flow of milk below the estimated normal yield during the periods when foods possessing a high albuminoid ratio were supplied to the cows was calculated to be as follows: Vetches, 38.5; beans, 24.0 and 14.8; decorticated cotton cake, 15.8; decorticated cotton-cake and meal, 8.3; cummins, 23.3.

Experiments of a somewhat similar character to those referred to above on the rational feeding of milch cows have been carried out on a more elaborate scale for some years past at the physiological experimental station of the agricultural academy at Poppelsdorf, Bonn, by Drs. Hagemann and Ramm, and reports of the results obtained have been published in the *Landwirthschaftliche Jahrbücher*. The prime object of these experiments was also to determine the influence of concentrated foods on the production of milk and meat.

In the more recent of these investigations, which were under the direction of Dr. Hagemann, the special foods submitted to trial were maize, rye, wheat pollards, cottonseed meal, earth-nut cake, poppyseed cake, bruised barley, malt sprouts, palm-nut cake, and molasses, in addition to the ordinary provision of hay, straw, and roots. The proportions of the articles constituting the ordinary ration varied with the nature of the concentrated fodder: the daily allowances were as follows:—Hay, from $5\frac{1}{4}$ lbs. to $13\frac{1}{4}$ lbs.; straw, 2 lbs. to 6 lbs.; and roots, $48\frac{3}{4}$ lbs. to $61\frac{1}{2}$ lbs. In addition to this standard keep there was given at different periods one of the following rations:— $13\frac{3}{4}$ lbs. of maize, $11\frac{3}{4}$ lbs. to $13\frac{1}{4}$ lbs. of wheat pollards; 13 lbs. of rye; $5\frac{1}{2}$ lbs. of rye and $4\frac{1}{2}$ lbs. of palm-nut cake mixed; $3\frac{3}{4}$ lbs. to $4\frac{3}{4}$ lbs. of cottonseed meal; 3 lbs. to $3\frac{1}{2}$ lbs. of earth-nut cake; 5 lbs. to $5\frac{1}{2}$ lbs. of poppyseed cake; 9 lbs. to 10 lbs. of malt sprouts; 8 lbs. to 10 lbs. of bruised barley, mixed with 4 lbs. to 6 lbs. of palm-nut meal; and $7\frac{3}{4}$ lbs. of molasses mixed with other foods.

In summarising the results of his experiments, Dr. Hagemann states that the production of milk proved to be dependent in certain respects upon the nature of the food

supplied to the cows, but not, as is usually supposed, solely upon the albuminoid ratio. If the foods employed are classified according to their apparent average influence in increasing the yield of milk, irrespective of its fat contents, his report gives the following order: maize, wheat pollards, malt sprouts, earth-nut cake, cottonseed meal, poppyseed cake, and rye and palm-nut cake mixed. It will be observed that the highly albuminous rations of oilseed cakes and meals were less effective in increasing the flow of milk than the other foods named. With respect to the fat-contents of the milk, the oil cakes, with the exception of poppyseed cake, rank before the other foods; the order under this head working out on the average as follows: palm-nut cake and rye mixed, cottonseed meal, earth-nut cake, maize, malt sprouts, wheat pollards, and poppyseed cake. The results obtained with rye were conflicting.

The object of these experiments was, however, not merely to test the effects of the use of various concentrated foods upon the secretion of milk, but also to ascertain which of those foods furnished on the whole the largest margin of profit. Hence, with a view to determine the economic value of the several foods, Dr. Hagemann compares the value of the milk produced in the separate periods during which the respective foods were employed with the cost of each ration. Judged from this standpoint, the results of the experiments are stated to have shown that maize is in every respect a profitable fodder for milch cows, both as regards its influence on the quantity and quality of milk produced, and on the production of meat. Next to maize the following foods are placed in order of value: wheat pollards, cotton-seed meal, and earth-nut cake. Molasses were found to have a stimulating effect on the milk glands: the cows receiving molasses yielded for a time more and richer milk than the known constituents of this ration would lead one to expect, but there was a marked reaction when the molasses were withdrawn, in spite of the substitution of other fodders containing high percentages of albuminoids. Moreover, it was found that molasses augmented the secretion of urine by about 50 per cent., and Dr. Hagemann considers it probable

that continued feeding with large quantities of this article would bring about disturbances of the heart and kidneys.

Poppyseed cake is stated to have reduced the fat-contents of the milk, and it proved to be generally less valuable as a milk-producing ration than the other special foods used in the experiments.

The earlier experiments at Poppelsdorf were carried out in the winter of 1894-95, under the direction of Dr. Ramm. In his report upon the results, Dr. Ramm points out that while every concentrated food may have a certain effect upon the secretion of milk, this effect depends very much upon the individual characteristics of the animal, and that it frequently happens that the same fodder will produce opposite results in different animals. Making allowance for this feature, he classifies the foods into three classes according to their effect upon the secretion of milk.

In the first class, or those which exercise a decidedly favourable influence, are the following: molasses and palm-nut cake mixed, bruised barley, malt sprouts, linseed meal, bruised maize and wheat pollards mixed, and bruised oats. The mixture of molasses and palm-nut meal was placed first among the fodders influencing the richness of the milk in fat, but it did not effect any material increase in the live weight of the cows; and attention may be directed in this connection to Dr. Hagermann's remarks as to the physiological disturbances likely to arise from continued feeding with molasses. The bruised barley produced a marked increase in the flow of milk with a satisfactory percentage of fat-contents; the live weight of the animal did not, however, show much increase with this ration. Malt sprouts appeared to reduce the yield of milk, but in other respects this fodder furnished satisfactory returns. Wheat pollards produced over average returns in all respects. Maize, oats, and linseed meal increased the yield of milk, but the percentage of fat-contents was not quite satisfactory.

Foods which are stated by Dr. Ramm to have exercised a distinctly unfavourable influence on the secretion of milk include cocoanut cake, poppyseed cake, sunflower-seed cake,

rye pollards, earth-nut cake, and cottonseed meal. In the case of the last two foods in this category the experiments showed a marked deficiency of fat-contents and dry substances in the milk, as well as a reduced flow, and two of the cows fed with cottonseed meal exhibited slight affections of the udder.

Rations of rape cake, bruised wheat, bruised rye, palm-nut cake, and dried grains are stated to have furnished indifferent results as regards the effects on the production of milk. Palm-nut cake increased the percentage of fat, but in other respects it proved less satisfactory: the milk had an oily flavour and a pronounced, sharp flavour. The dried grains had a beneficial influence on the live weight, but the results obtained with this fodder were not otherwise particularly favourable.

EARLY MATURITY OF LIVE STOCK.

The fourteenth annual report of the Bureau of Animal Industry of the United States Department of Agriculture contains an article by Mr. C. F. Curtiss, Director of the Iowa Agricultural Experiment Station, on "Some Essentials of Beef Production," in which attention is directed, *inter alia*, to early maturity as one of the considerations having an important practical bearing on the meat producing industry. A few years ago the prevailing practice among American cattle breeders and graziers was to allow the steer the first three years of its existence in which to attain the standard growth, and to supplement this by six months on a heavy grain ration for the fattening process. The two periods were regarded as essentially distinct, and it was believed that they must always remain so. Under these conditions, as the fattening process advanced the gains invariably diminished, the last hundred pounds produced on a bullock not infrequently costing per lb. treble the live weight value per pound of the animal on the market. The market demand was, at that period, in the direction of heavy cattle. For instance, in January, 1893, the Iowa experiment station sold cattle weighing 1,500 pounds each that were valued at 1s. 6 $\frac{3}{4}$ d. per

cwt. below 1,700 pound cattle of the same quality. The buyers stated that they were equally good in every respect, except that they lacked the size required to furnish the cuts demanded by the trade. A marked change has taken place, however, in America in recent years. The large, over-fattened steer is supplanted by the well-fattened, medium weight carcase, and it is considered probable that the old heavy weights will never again outsell the compact bullock of prime quality and medium weight.

In commenting upon the advantages to the feeder of this change in the direction of earlier maturity, Mr. Curtiss observes that it is a well-established principle in animal nutrition that young animals make more economical gains than older ones, and that the amount of food required to procure a given gain in weight increases as the age of the animal advances toward maturity. Experiments are recorded where gain has been made at the rate of one pound of increase in live weight for each pound of dry matter consumed as food. This was in the case of calves under three weeks old, each of which was fed daily with 17.6 lbs. of milk, to which 3.9 lbs. of cream were added.

In an experiment conducted at the Iowa Experiment Station, a gain of 1 lb. in live weight was obtained from every 1.97 lbs. of dry matter in the rations consumed during a period of ninety days, beginning when the calves were about one week old. The food consisted of separated milk, supplemented with maize, oats, and oilcake meal, and in addition a moderate allowance of hay. But as compared with this, during the first eight months it required an average of 4.6 lbs., and for the first seventeen months 5.97 lbs. of dry matter in the food, to procure a gain of one pound live weight; and for a period of two years the average amount of food necessary to return one pound of live weight increase rose to 7.19 lbs., and during the last four months it ran up to 9.02 lbs. In another experiment five steers were finished for market at the age of 32 months, and on the average 10.4 lbs of food were given to obtain a pound of increase at this age. In a summary of results obtained at the experiment stations in eight American states, covering 132 head of cattle from two

to three years old, it is shown that it required on an average 10.24 lbs. of food (dry matter) to procure a pound of increase in live weight.

These results are said to have been repeatedly verified by many other experiments, not only with cattle, but also with sheep and swine. In comparing the gain made by pure-bred Shropshire lambs and pure-bred Shropshire yearlings at the Iowa Agricultural Experiment Station, it was found that the lambs gained weight at the rate of 1 lb. for each 7.18 lb. of food consumed, while it required 11 lb. of food to make a pound increase in the yearlings.

The law of diminishing returns for food consumed as animals advance in age towards maturity is, Mr. Curtiss maintains, conclusively established, and should be kept in mind by the meat producer, since economy of production is one of the important factors in the determination of profit, and the advantages are all with the young and growing animal as compared with one that has practically attained its growth.

“The policy of the feeder,” he says, “should be to make use of the advantages of early maturity so far as practicable and consistent with existing conditions. It is not in all cases practicable to do so, however, except in a moderate degree. Forcing to an early finish necessarily means more expensive feeding than where longer time is taken and more use is made of cheaper coarse feeds. Where lands are cheap and grazing and coarse fodders abundant, it may even yet be desirable to take more time for finishing animals for the block and thereby secure greater weight with the minimum amount of grain. In the great feeding section within what is known as the “corn belt,” however, the conditions are such as to favour the liberal policy of feeding from first to last, and under these conditions early maturity may be attained by a generous use of the ordinary feeding stuffs throughout the entire growing and fattening period, quite as well or even better than by too extensive use of the more concentrated and expensive grain feeds. That is to say, early maturity may be largely accomplished by the liberal use of the cheaper foods of the farm, combined with a suitable

grain ration, which may be quite moderate, except in the finishing period. The modern feeder must combine the advantages of economy of production resulting from early maturity, and the excellence and enhanced value of the finished product that can only come from the right kind of stock well handled. This implies good breeding and continuous good feeding. These requirements are no longer merely subservient, but practically imperative.”*

EXPERIMENTS IN PIG FEEDING.

At the Central Experimental Farm of the Canadian Department of Agriculture some experiments have been carried out to compare the effects of feeding pigs with unground grain and ground grain respectively. The grains tried included oats, barley, maize, and a mixture of barley, oats, and pease. The unground grain was soaked for fifty-four hours before feeding. The pigs all belonged to two litters, and were as evenly graded in groups as possible.

A pen of four cross-bred pigs of an average weight of 97½ lbs. were fed on oats and skim milk. The quantity of unground oats consumed by this lot per lb. of increase in live weight was 4.21 lbs., and of skim milk 3.45 lbs. In

* Cf. the Fifth report of Experiments on the Feeding of Sheep, in the Rothamsted Memoirs, by Sir J. B. Lawes and Sir J. H. Gilbert, in which the following passages occur:—“On the whole, it is concluded that there is considerable economy of food in the system of early and rapid fattening of sheep; and that, after the animals have attained a moderate degree of fatness, it will seldom be profitable, and may frequently be a loss to the producer to feed them further. The same remarks will probably apply, *mutatis mutandis*, to oxen also.”

“The same rule does not apply with equal force to pigs. The dry substance of the foods of pigs is, weight for weight, much more costly than that of the other animals; but, in their case, from the much larger proportion of increase they yield, both for a given amount of dry substance of food consumed and for a given weight of the body within a given time, it results that the amount of constituents expended by the respiratory process bears a considerably less proportion to the gain in weight than in that of either sheep or oxen. Again, their increase consists in a larger proportion of fat; and by the fatness of the meat its quality and value are to a great extent determined. On the other hand, not only do the quality and rateable value of mutton and beef reach their maximum, or nearly so, at a comparatively limited degree of fatness, but it appears that the amount of constituents expended by respiration increases more rapidly in proportion to a given weight of saleable increase as the animals progress in fatness.”

order to find out what proportion of the grain passed through the animals undigested the excrement was carefully collected for twenty-four hours and washed; from 14 lbs. of grain fed, 2 lbs. 6 ozs. of undigested oats were obtained, weighing $22\frac{1}{2}$ lbs. per bushel, and when tested for vitality 11 per cent. germinated. The average live weight of the pigs when killed was $170\frac{1}{4}$ lbs.; a gain of 87 lbs.

With the barley four pigs, weighing $97\frac{1}{4}$ lbs. each, were fed for twelve weeks on unground barley soaked in water fifty-four hours, all they would eat, with 3 lbs. of skim milk per day to each pig. It required 3.64 lbs. of barley and 2.52 lbs. of skim milk for each pound of increase in live weight. From 17 lbs. of barley fed in twenty-four hours, 2 lbs. 2 ozs. of undigested grain were separated, which, when dried, weighed 35 lb. to the bushel, but none of the kernels sprouted. The average gain in live weight was 100 lbs.

Four pigs were fed for twelve weeks on unground pease soaked in cold water for fifty-four hours, as much as they would eat, with 3 lbs. of skim milk per day to each pig. These pigs consumed 3.33 lbs. of pease and 2.35 lbs. of skim milk for each pound of increase. From 17 lbs. of pease fed in twenty-four hours, only 2 ozs. of undigested grain were separated. The average increase in live weight was 107 lbs.

Three pigs, of a live weight of 72 lbs., were fed for thirteen weeks on unground Indian corn soaked for fifty-four hours, with 3 lbs. of skim milk per day to each pig. They consumed 2.90 lbs. of corn and 2.31 lbs. of skim milk for each lb. of increase. From 11 lbs. of corn fed during twenty-four hours there were separated 8 ozs. of undigested grain, which, when dried, weighed $40\frac{1}{4}$ lbs. per bushel. The average increase in live weight in this lot amounted to 118 lbs. each.

Three swine were fed for thirteen weeks on a mixture of equal parts of unground oats, barley, and pease, with 3 lbs. of skim milk per day to each. They consumed 3.20 lbs. of this mixed grain and 2.60 lbs. of skim milk for each lb. of increase. In this lot the average live-weight gain was 103 lbs.

The increase in live weight was found to be greatest in the lot fed with maize, and these pigs also showed the least shrinkage in dressed weight.

Further experiments were made with feeding with ground grain, soaked and dry, the meal being composed of equal parts of oats, barley, and pease, with a half part of bran. To one pen this meal was fed after it had been soaked for thirty hours in cold water; in the other case it was fed dry and a tub introduced into the pen with water so that the pigs could drink as often as they desired it. Each pig was given 3 lbs. of skim milk per day as in the other tests, and all they could consume of soaked meal in one case and of dry meal in the other case. These pigs were from the same litter, and they weighed about 100 lbs. each at the start, there being a difference of only 4 lbs. in the total weight of each pen.

The four pigs fed on meal soaked made one pound of increase in live weight on a consumption of 4.69 lbs. of meal and 3.61 lbs. of skimmed milk, whereas the four pigs fed on the same meal dry made a pound of increase from 4.19 lbs. of meal and 3.20 lbs. of milk. Those fed with dry food made 34 lbs. less weight in the same time to the pen, and they consumed 316 lbs. less of grain. So that it appears from this experiment that it is more economical to feed meal dry.

One lot of four pigs weighed 407 lbs., and the other lot of four a total of 403 lbs. At the close of the test the first lot weighed 756 lbs., and the second lot 718 lbs. Those that were fed on the moist food did not do so well as those that were fed on the dry food until the last four or five weeks of the feeding period. In the meantime they had grown a little more "rangy," and during this latter period they put on weight more rapidly than those fed on dry meal, but there was more shrinkage when they were killed. Those fed on dry grain were shorter, more solid and compact, and they made on the whole more flesh with the consumption of less grain.

The live weight of the first lot fed on soaked meal, fasted 14 hours, was 743 lbs., and the dressed weight 24 hours after killing was 540 lbs. In the other case, where the pigs were fed on dry meal, the live weight, fasted 14 hours, was 690 lbs., and 24 hours after killing it was 545 lbs. There was nearly 50 lbs. less shrinkage with those fed dry.

The results of these experiments are held by the Director

of the Dominion Experimental Farm to show that on the whole the advantage was with the meal as against the unground grain.*

AGRICULTURE AND LIVE STOCK IN NEW ZEALAND.

The following details of the area and production of crops and of the live stock of New Zealand are taken from the Report of the Department of Agriculture of that Colony for 1898. The particulars as to the chief corn crops and potatoes are as under (the date as to area referring to the 15th November) :—

Crop.	1897-8.			1896-7.		
	Area.	Production.		Area.	Production.	
		Per Acre.	Total.		Per Acre.	Total
	Acres.	Bushels.	Bushels.	Acres.	Bushels.	Bushels.
Wheat -	315,801	18	5,670,017	258,608	23	5,926,523
Oats -	354,819	27·4	9,738,391	372,597	30	11,232,803
Barley -	29,920	23·7	709,874	29,813	28	821,506
Rye -	1,915	20·5	39,202	3,245	20	65,629
Maize -	14,837	44·1*	653,914*	12,534	40·2	503,652
		Tons.	Tons.		Tons.	Tons.
Potatoes -	36,402	4·95	180,333	29,990	5·25	157,529

* Estimate only.

The above areas do not include those cultivated with cereals intended to serve as fodder for stock. The harvest of 1898 is stated to have been unsatisfactory so far as the yield of grain was concerned. The greater part of the wheat-growing district of the Middle Island suffered from drought; and on this account a deduction of 30,000 acres in the acreage under wheat has been made in the returns from the full total of 345,801 acres sown for threshing in 1897-8. Similarly, and for the same reason, 30,000 acres have been deducted from the area under oats, and 2,000 from that under barley. There

* See also the notices of similar experiments in Germany in Vol. II., p. 444, and Vol. IV., p. 79, of this Journal.

was also a small acreage of wheat sown for chaffing, ensilage, or feeding down with stock, the total ultimately utilised for these purposes (including the estimated 30,000 acres transferred from wheat originally intended to be threshed) being 32,214 acres. Of oats the total acreage for the same purposes was much larger, amounting to 224,770 acres (mostly for chaffing).

Under crops for which particulars of the yield are not given the largest areas were as follows :—

Crop.	1897-8.		1896-7.	
	Ploughed.	Not Ploughed.	Ploughed.	Not Ploughed.
	Acres.	Acres.	Acres.	Acres.
Grass, for feeding down - -	3,992,779	5,675,541	4,130,082	5,664,203
„ hay only - - -	49,686	15,117	81,414	25,087
„ ensilage - - -	1,138	459	983	228
„ seed (cocksfoot and rye grass) - - -	42,551	51,256	50,187	41,253
Clover, for feeding down - -	28,077	—	33,226	—
„ hay - - -	3,062	—	2,965	—
Turnips - - -	393,451	—	408,668	—
Mangolds - - -	9,353	—	7,755	—
Rape - - -	77,131	—	63,607	—
Orchards ($\frac{1}{4}$ acre and over) - -	22,123	—	21,930	—

In addition, there were also some twenty-two million acres under tussock or native grasses; while there were a few thousand acres under grasses or clovers for purposes other than those enumerated in the table.

The number of live stock in the colony was as follows, the figures also referring to the 15th November, except in the case of sheep, which are returned as on the 30th April :—

Year.	Horses.	Cattle.	Sheep.	Swine.
	No.	No.	No.	No.
1897-8 - -	253,227	1,209,165	19,687,954	186,027
1896-7 - -	250,247	1,138,067	19,138,493	209,834

The increase in cattle is chiefly among cows or heifers for dairy purposes, and in steers and heifers under two years old. Of the sheep rather more than three million were

merinos ; the wool clip as a whole was generally good and above the average. The diminution in pigs is attributed to, probably, increased prices of grain, combined with exceptionally dry weather and consequent scarcity of roots.

MEAT EXPORTS FROM NEW ZEALAND.

The Secretary for Agriculture for New Zealand, in his Report for 1898, states that the shipments of frozen meat from that Colony during the year ending 31st March, 1898, amounted to 1,736,546 carcasses of mutton, 1,258,658 carcasses of lamb, and 69,494 cwts. of beef. These figures show considerable increases over the previous year. The total weight of the mutton and lamb was 1,368,668 cwts., valued at £1,545,769, as compared with £1,142,312 in 1896-7. The export of lamb is being increased rapidly, and it is anticipated that it will shortly exceed that of mutton. The beef was valued at £74,406.

The growth of the trade in frozen mutton during the past fifteen years may be exhibited in the following table, in which are included the exports of beef, so far as specified in the Report :—

Year ending 31st March.	Mutton.	Lamb.	Beef.
	Carcases.	Carcases.	Cwts.
1882 (estimated) - -		30,488	—
1883 " - -		173,988	—
1888 - - - -		931,526	—
1893 - - - -	1,300,717	325,659	37,074
1896 - - - -	1,692,980	730,934	26,240
1897 - - - -	1,428,430	781,539	22,892
1898 - - - -	1,736,546	1,258,658	69,494

It will thus be seen that the falling off which had taken place in the exports of mutton in 1896-7 has been more than recovered. The exports of beef are more than treble the quantities shipped in the previous year ; but the development of this trade is not so well shown by the above table as is

the case with the mutton, for in 1894 the exports of beef fell to 3,799 cwts. only, rising to 25,088 cwts. in 1895.

It is stated that reports from London show that the meat was generally in good condition on arrival, and that claims for damages were fewer. The prices ruling for lamb were reported to be very low, and it is thought that heavy losses must have resulted. The freights charged per lb. for carriage were $\frac{1}{2}$ d. or $\frac{3}{4}$ d. for mutton, and $\frac{1}{2}$ d. or $\frac{5}{8}$ d. for beef, according to season, while lamb was a little dearer ($\frac{9}{16}$ d. and $\frac{1}{16}$ d.), with 10 per cent. primage, and a rebate of 5 per cent. when freight was paid in the Colony, and of 3 per cent. when paid in London.

EXPORTATION OF DAIRY PRODUCE FROM NEW ZEALAND.

In the reports to the New Zealand Secretary for Agriculture on the exportation of dairy produce from that colony during the year ending March 31, 1898, it is stated that the quantities shipped show a gratifying increase over the previous year's total. The exports of butter amounted to 106,840 cwts., an increase of 31,553 cwts., or 41 per cent. over those of 1896-7; while the value, £429,407, as compared with £297,518, increased in rather greater proportion (44 per cent.). The shipments of cheese (78,705 cwts. in 1897-8, and 71,663 cwts. in 1896-7) showed an excess of 10 per cent. over the earlier year. Their value, however, increased by 13 per cent., the totals in the two years named being put at £154,144 and £135,711 respectively.

The Agricultural Department of New Zealand, it is stated, early recognised the wisdom of aiding the industry by every means in its power, and the system of grading and reporting on each lot of produce shipped to the mother country is considered to have had a beneficial effect on the quality, and consequently on the market value, of the colony's goods. The free cold storage for butter provided by the Department has also proved of great assistance to producers. Side by side with this increase, however, the butter exports of New Zealand's principal Australian competitor, Victoria,

have fallen off steadily for the past three years, and it is largely to the misfortunes of the latter that the former owes the satisfactory prices obtained for its autumn make during that period. Without the Australian demand New Zealand would have found it difficult to dispose of its March and April butter at anything like a profitable figure. The shortage from Victoria also, it is stated, favourably influenced the British markets, causing the colonial season to finish up more satisfactorily than was at one time anticipated.

The cheese market during the season was depressed, chiefly owing to the competition of Canada and the United States. New South Wales and Queensland took a considerable quantity of loaf cheese at fair prices.

Of the butter, 78,588 cwts., in 151,052 packages, were shipped to Great Britain. These exports were classified as creamery (132,533 packages), dairy (5,457 packages), and "milled," i.e., factory, butter (14,062 packages), and each of these classes was further sub-divided into three grades. Of the creamery butter almost 93 per cent. was reckoned as first grade, and 7 per cent. second grade, a very small fraction ranking as third grade; but in the other classes the proportion of first quality was much lower, amounting to only 63 per cent. of the dairy, and 59 per cent. of the factory butter, and about one-third of the total was in either class reckoned as second grade.

The Railway Department provided regular services of refrigerator cars for butter two or threetimes a week, and these are stated to have been of great advantage. All through the season the butter arrived at the cool stores in a satisfactory condition when forwarded by these cars, the larger portion being firm and cool. The existence of a cool store and port of shipment within easy distance of most of the factories in the province of Taranaki—the greater portion of the butter is exported from New Plymouth—is referred to as having been of much service, 76,000 packages passing through the Moturoa freezing works during the season. As a depôt and grading store for dairy produce these works are thought to leave little to be desired, either for convenience, management, or cleanly surroundings. All butter was four clear

days in store, and thoroughly frozen, the average temperature of twenty-one shipments from the breakwater being 7.7° Fahr. (highest 12°, lowest 5°).

The ocean shipping arrangements are characterised as less convenient: the main drawback is considered to be the irregularity of despatch, or, rather, of arrival in London. Cheese is placed at a further disadvantage, inasmuch as it requires to be carried in a separate chamber, kept at a particular temperature. It happens sometimes that the quantity available is insufficient to fill a chamber, in which case the carriers lose by dead space. Butter, on the other hand, is stowed along with frozen meat, and can consequently be taken at any time in any quantity: in short, cheese gives the shipping companies more trouble than butter, and does not pay them so well.

PRODUCTION OF CEREALS IN PORTUGAL.

In a Decree issued by the Portuguese Minister of Public Works, providing for the sanitary inspection of flour and bread, some particulars are furnished of the production of cereals in Portugal. It appears that about 25 per cent. of the cultivated area of the country is sown annually with wheat, rye, and maize; but owing to the limited use of fertilisers the yield of these grains is comparatively small, amounting on the average to 9 bushels per acre for wheat, 7 bushels for rye, and 22 bushels for maize. The area sown annually with each of these cereals and the total production are given as follows:—

	Acres.	Bushels.
Wheat	771,000	6,875,000
Rye	823,000	5,500,000
Maize	679,000	15,125,000

The total production of the three grains is estimated, therefore, at 27,500,000 bushels, and as the quantity is insufficient to meet the requirements of the population, there is necessarily a large importation, particularly of wheat. In the five years 1893-1897 there was an annual average importation into Portugal of 4,854,000 bushels of the last named cereal.—*Jornal de Commercio*.

LIVE STOCK IN THE UNITED STATES.

According to the returns collected by the Department of Agriculture at Washington, the number of live stock on farms in the United States on Jan. 1, 1899, comprised 13,665,307 horses; 2,134,213 mules; 15,990,115 milch cows; 27,994,225 oxen and other cattle; 39,114,453 sheep; and 38,651,631 swine. Compared with the numbers returned for the corresponding period of 1898, this year's figures show a decline of 295,604 in horses; 56,069 in mules; 1,269,972 in oxen and other cattle; and 1,108,362 in swine. On the other hand, there is an increase of 149,229 milch cows, and of 1,457,493 sheep.

ABSORPTION OF ODOURS BY MILK.

The question of the relative absorption of odours by warm and cold milk has recently been the subject of some experiments at the Wisconsin Agricultural Experiment Station, and the conclusions arrived at by Dr. Russell, the Bacteriologist at that station, are given in the Fifteenth Annual Report which has recently been issued. This investigation was undertaken as it had been incidentally observed in the course of some experimental work in another direction that warm milk seemed to absorb odours more rapidly than cold milk. As this observation was contrary to the belief commonly held that milk would not absorb odours when it was warmer than the surrounding air, it was thought worth while to make some experiments on the subject.

In the first set of experiments silage and manure were used, as being the substances that are most likely to cause trouble in the barns, and it was found, almost without exception, that the samples of warm milk were more strongly impregnated with the odour of these substances than milk which was at a lower temperature than the air. In these experiments the milk used was from the general creamery supply, and it was thought possible that an objection might be urged that the conditions did not conform to those of practice, inasmuch as the warm milk direct from the animal

might not act in the same way as that which had been heated up after once being cooled. To meet this possible objection another set of experiments was instituted.

In the second series the milk was drawn from the animal and immediately submitted to the influence of different odours emanating from certain kinds of volatile essential oils, as it was thought that they would permit of a ready detection and would better serve to illustrate the truth of the principle involved. For this purpose trials were made with oil of cinnamon, winter-green, and peppermint, as well as with horse manure and urine of cows. The results of this second series of tests also showed that the odour in the warm milk is more intense than in the cold, signifying that absorption takes place in a greater degree when the milk is warmer than the surrounding air. In 148 cases out of 171, or 86 per cent., the observers decided independently that the odour peculiar to the different tests was more apparent in the warm than in the cold milk.

Regarding the relative intensity of the odours absorbed, the essential oils seemed to be taken up more actively by the milk than the other substances. Peppermint was the most readily absorbed; after exposures lasting ten, fifteen, and twenty minutes, a slight though distinct trace of this odour could be detected in the warm milk. The odour arising from fresh horse manure did not seem to be absorbed in so marked a degree as that given off by the oils.

The odour of fresh urine readily tainted the milk, but stale urine did not seem to impart so marked an odour. As the volatile ammonia which is generally evolved from decomposing urine is not absorbed so readily in warm as in cold liquids, it was thought that this property might change the general results; but there is, it appears, a peculiar odour arising from urine, independent of the ammonia contained, which imparts to milk an undesirable taint that is readily recognised.

In the light of the above data, Dr. Russell states that the common ideas of dairymen that milk gives off odours when warm, and takes them up only when cooler than the surrounding air, stand in need of modification. Undoubtedly,

milk absorbs odours (pleasant and otherwise) when it is either warmer or cooler than the surrounding air, but this absorption is much more active in warm than in cold milk.

These experiments are held to show that the practice of leaving milk in the milking sheds for any considerable length of time is contrary to good dairy principles. Such a treatment renders possible not only the introduction of bacterial life from the germ-laden air, but the direct absorption of stable odours that will seriously impair the value of the milk for direct consumption, or for butter and cheese making. It may be said that if the milk is not allowed to remain longer than during the milking process the danger is so small that it can be safely neglected, but such a practice is not recommended. If the shed is kept thoroughly cleaned and is well ventilated, an exposure for a few minutes might not produce serious results; but if the object is to produce as perfect an article as possible, then even this limited exposure is, according to Dr. Russell, fraught with danger from the purely physical standpoint, apart from the biological phase of the question.

IRISH AGRICULTURAL BANKS.

In the seventh report of the Congested Districts Board for Ireland reference is made to the co-operative agricultural banks, on the Raiffeisen system, which have been introduced into Ireland during the past three years by the Irish Agricultural Organisation Society. On March 31st, 1898, fifteen of these banks had been established; but since that date the number has increased to thirty-nine.

In order to assist in giving the system a fair trial in the congested districts, the Board agreed to advance to six banks at Carna, Rossmuck, Burriscarra, Addergoole, Spiddal, and Kilmore-Erris sums of £50 to £100 each—£400 in all—in the form of loans at 5 per cent. interest, issued on the joint and several security of the members of the committee of management in each case; $2\frac{1}{2}$ per cent., half the interest charged, to be afterwards returned to the bank if the Board are satisfied with the manner in which

the business has been conducted. Since the close of the year 1897-8 the Board have approved of further loans to fourteen banks.

It may be noted that the Societies' Borrowing Powers Act, passed in the 1898 Session of Parliament, empowers these agricultural banks, which are registered under the Friendly Societies Act, to borrow money from persons other than their own members.

MANURING OF GARDENS.

A pamphlet entitled "Notes on Garden Manuring," prepared by Dr. Somerville, Professor of Agriculture and Forestry at the Durham College of Science, for distribution by the County Councils of Northumberland, Cumberland, and Durham, furnishes some useful hints relative to the application of fertilisers to market-garden land, and to kitchen- and cottage-gardens.

Of the two classes of manures—farmyard and artificial—it is observed in the pamphlet that if plenty of the former be available the gardener need not trouble himself much about the other, though even then a little is sometimes useful in starting a crop, or for forcing "show" vegetables. But to give satisfactory results, farmyard manure must be at least four months old and well rotted: fresh manure, or manure that has been kept too dry, has often a disappointing effect, and this is more frequently the case when it comes from a stable than from a byre.

Most gardeners have, however, a difficulty in obtaining a plentiful supply of good farmyard manure, so that they are forced to look out for something else. They see farmers using artificials on their fields with good results, and are often disposed to give such manures a trial in their gardens. Now, although artificial manures may generally be profitably employed for assisting the growths of all kinds of crops, they do not offer a complete substitute for farmyard manure. Very few farmers attempt to fertilise their land by means of artificials only; in the great majority of cases they apply a

dressing of farmyard manure every fourth or fifth year, and use the artificials in the intervening years. Farmyard manure, in fact, does something for land that artificials cannot do to any appreciable extent, for it not only supplies crops with food, but it also changes the character of the soil, and in many ways makes it much better adapted for the requirements of plants. This mechanical improvement of the soil is due to the humus which is formed by the decay of the straw and other organic matter in the farmyard manure, and without a good supply of humus no soil can be said to be in a high-class state of fertility. If, therefore, a garden can be well dressed with farmyard manure every third or fourth year, its fertility may be fairly well maintained by the use of artificials in the intervening years; but if no farmyard can be got, something else must be used from which humus may be formed. Such substances are rotten turf, the parings of roads, ditch scourings, the cleanings and switchings of hedges, garden rubbish, dead leaves, and cut grass; and if material of this kind be allowed to lie in a heap for a few months before being dug into the soil, it will do much to improve the fertility of a garden. It has not the "strength" of farmyard manure, but that can be supplied by artificials, and it will make the application of the latter much more certain and effective. Possibly a good many weed seeds may be introduced to the land by the application of such material, but careful hoeing at an early stage will easily get rid of the plants that are thus produced. Ashes will not form humus, but they materially improve the character of land—especially clay soil—and, where available, they should be used to a moderate extent.

One way in which, it is suggested, the stock of humus in a garden may be increased is to give attention to "green manuring," which consists in growing a crop for the express purpose of digging it into the land. As a rule it will not pay to convert the growth of a whole season into manure, but it will generally be worth while to grow a "catch crop" for the purpose. Early potatoes, peas, and certain other crops are ready for use in July, and between that time and the month of October there are about two months of good growing

weather, when the land can be usefully occupied in producing green manure. Without the loss of a day, the land from which a crop is removed before the middle of August, if required for no other purpose, should be forked over, and the seed of some quick-growing plant should be sown to form a catch crop. White mustard, rape, crimson clover, and Italian rye grass may all be used for this purpose, and 1 lb. of seed will be sufficient for about 200 square yards of ground. It is, however, recommended that the two first-mentioned plants should not be grown on land that is to be stocked in the following year with turnips, cabbages, cauliflowers, or crops of that family; but this caution is, it appears, chiefly necessary where the land is subject to club-root.

Although it has been pointed out that too much must not be expected from artificial manures, and that humus must be formed in some other way, still there is no doubt that such manures may often be usefully employed in garden cultivation.

From investigations made in the chemical laboratory of the Durham College of Science, the following mixture of artificials is said to furnish good results at a moderate outlay:—

5 cwt. (or 5 lbs.) superphosphate.

5 cwt. (or 5 lbs.) fine bone-meal.

2½ cwt. (or 2½ lbs.) fish-meal.

2½ cwt. (or 2½ lbs.) sulphate of ammonia.

5 cwt. (or 5 lbs.) kainit.

The proportions are shown in hundredweights and pounds, the former applying to the quantities required for large areas, and the latter to the quantities suitable for small gardens.

As a guide to the rate of application, it may be said that a full dressing would be 1 lb. on four square yards of ground; if it is desired to apply more, an interval of two or three weeks should be allowed to elapse between the two dressings. For tomatoes in pots and pot plants generally, ½ oz. well mixed with the soil of a 10 or 12-inch pot would be an ample supply.

PRODUCTION OF EGGS IN WINTER.

A statement made before the Select Standing Committee on Agriculture and Colonisation of the Canadian Parliament by Mr. A. G. Gilbert, the manager of the Poultry Branch at the Central Experimental Farm, Ottawa, contains some interesting observations on the results of some experiments in the treatment of fowls for the production of eggs in winter.

The feeding of fowls in order to obtain eggs from them in winter is held by Mr. Gilbert to be a scientific process, inasmuch as what will cause the more active and nervous birds of the Mediterranean class—namely, Leghorns, Minorcas, Spanish, and Andalusians—to lay will make the heavier and more phlegmatic Brahmas, Langshans, and Cochins of the Asiatic class so fat that they will not lay at all. Moreover, past experience at the Central Experimental Farm has proved that hens and pullets require different treatment, since the rations which caused the pullets to lay well would make the hens too fat to lay, or cause them to lay eggs with thin or malformed shells. It has also been found by experiments conducted at the farm that the feeding of three rations per day appeared to be too fattening, and these were consequently reduced to two, one in the morning and the other in the afternoon. This practice of feeding poultry only twice daily has, it appears, furnished satisfactory results. The early morning ration was constituted as follows: three mornings, raw or green bones ground, and on the other mornings a warm mash composed of shorts, ground oats, ground barley, ground rye, wheat bran, steamed lawn clippings or steamed clover hay, the latter cut into short lengths. No mid-day ration was given, but vegetables or roots were always kept before the fowls. The afternoon meal was 20lbs. of wheat or buckwheat, sometimes oats, mixed for 204 fowls. The object of this method of feeding was to incite the laying hens to greater activity and to secure as much variety as possible in the rations in order to prevent the development of vicious propensities such as egg eating or feather picking, and to avoid the production of eggs with thin shells or without shells.

As a result of the adoption of these modified rations the health of the fowls is said to have improved, and the production of eggs to have increased; a reduction of the quantity of food by one-third was followed by an output of nearly one-third more eggs. In the year when three rations daily were given 218 hens yielded 11,452 eggs, and in the following year when the modified rations were provided 204 hens produced 14,357 eggs.

In the first three months of 1897 the eggs produced by the 204 hens receiving two rations daily were: January, 1,540; February, 1,351; and March, 1,668.

THE ECONOMIC CONDITION OF THE AGRICULTURAL POPULATION OF RUSSIA.

The distress caused in certain districts of European Russia by the partial failure of the harvest of 1898 has evoked from the Minister of Finance an interesting review of the general economic condition of the agricultural population of the Empire. The harvest of the past year in Russia in Europe was slightly below the average, but better than that of 1897, although the results were very unequal in different regions. In certain groups of provinces, particularly in the basin of the Volga and the Kama, the scarcity of produce was even more pronounced than in the previous year, for not only were the winter and spring sown grains a failure—in some localities the harvest did not yield the equivalent of seed sown—but the exigencies of the situation were rendered more embarrassing by a great dearth of straw and hay, so that the maintenance of live stock was also a difficulty. In the greater number of the remaining provinces of the Empire the results were, however, more satisfactory; the harvest was approximately an average one, and in the North-West the returns were even considered to be “good.” But notwithstanding the relatively satisfactory results of the harvest as a whole, the year 1898 must have been, it is stated, a disastrous one for the famine-stricken regions.

In addition to the relief afforded to the suffering popula-

tion of these districts from the ordinary resources at the disposal of the local authorities, the Government was obliged to vote considerable sums, amounting in all to £3,755,000, to alleviate the distress caused by the scarcity. This feature of the situation is one which, in the opinion of the Minister of Finance, deserves serious reflection. Apart from the financial considerations, which are in themselves of sufficient gravity, inasmuch as provision has to be made by the nation for an extraordinary expenditure which has long ceased to appear in the Budgets of the countries of Western Europe, the more pressing question which should occupy the attention of the Government is, it is pointed out, the general instability of the economic environment of the rural population: an environment which renders necessary the provision for such extraordinary expenditure. In a country like Russia, where the system of cultivation is extensive rather than intensive, agriculture is particularly exposed to seasonal vicissitudes beyond the control of those engaged in the industry, alternations of abundant and scanty harvests are inevitable, and consequently the calculations of the farmer should be based not upon the harvest of a single year but upon the average results of a series of harvests, or on the average production of his farm. It is evident, however, that this important factor in the rural economy of the country is not generally recognised by the agricultural population, particularly in the central and eastern governments, when it is remembered that the occasional occurrence of a really deficient harvest reduces a considerable section of those occupied in the cultivation of the soil to such depths of poverty that they are unable to extricate themselves without public assistance.

In some quarters the distressed circumstances of certain sections of the Russian peasantry are regarded as a manifestation of what is called the agricultural crisis, or, in other words, the fall in price of cereals on international markets. But, although this would be true in cases where large amounts of capital are invested in the production of grain for sale, it does not apply so much to the Russian peasant, whose transactions take place for the most part in "kind," and

are influenced only to a slight extent by the fluctuation of market prices. His prosperity is determined, under existing conditions, much more by the quantity of produce yielded by his land than by the level of prices.

Then with regard to the view that the weight of imperial taxation is responsible for the situation, the Minister of Finance holds that while such taxation may be a sensible burden in some localities, it cannot be regarded as the cause of the embarrassed condition of the rural population. The majority of the Russian peasantry are subjected to only two direct taxes, viz., the land tax and the mortgage tax (*annuité de rachat*), an annual premium payable for the interest and extinction of the mortgages on the land allotted to the serfs on their emancipation in 1861. The land tax was never very heavy, and by the Imperial Decree of the 14th May, 1896, it was reduced to an insignificant sum. The total amount of the *annuités de rachat* is a large sum in itself, viz., £10,347,000, but it is said not to exceed on the average 2s. 6½d. per person, or 15s. 4d. per family. The whole of the direct taxes, both imperial and local, do not constitute a very large item in the expenditure of the peasantry.

Nevertheless, these direct taxes, by their obligatory character and by their collection at a fixed date, apparently constitute a burden upon the mass of the population, since there has been an increased accumulation of arrears in the mortgage repayments payable to the State. On several occasions it has been found necessary to accord a period of delay for the settlement of these arrears, and by the 1st of December, 1898, the amount of arrears for which an extension of time for repayment had been allowed was as much as £7,360,000, apportioned among 25,858 villages.

In concluding his review of the situation, the Minister of Finance, while admitting that influences of an economic character and lack of education are to a certain extent obstacles to the progress of the rural population of Russia, expresses the opinion that the real difficulty lies in the indeterminate character of the social and proprietary rights of the peasantry. In the domain of civil law the position of the peasant is determined partly by the provisions of the statutes

of February, 1861, when the serfs were emancipated, and partly by the general code of the Empire ; but chiefly by local custom. The predominance of custom, which is perfectly admissible when the civil laws possess the simplicity of patriarchal conditions, no longer satisfies the requirements of the more complex surroundings of the Russian peasant of to-day. The basis of rural organisation is the "family," in the special meaning that this word possesses for the Russian peasant.* This state of affairs, in the absence of regulating principles, often gives rise to domestic dissensions, to the dissolution of the common tie, and to the depreciation of the common estate. The uncertain character of the rights of each member of the family over the property he has acquired, and of the duties he owes to the head of the family, induces a slackening of energy and a decreased productivity of labour. Simple additions to, or amendments of, existing laws will not, in the view of the Minister, remedy the defects of the present situation. The great questions of principle which affect the organisation of rural life in the Empire must be faced, and until this is done no relief measures, such as the establishment of agricultural credit banks and the opening up of fresh markets, will have any permanent effect in ameliorating the condition of the mass of the agricultural population.

AGRICULTURAL MACHINERY IN THE TRANS-CAUCASUS.

In a report to the Foreign Office on agriculture in the Trans-Caucasus, Mr. Consul Stevens states that the reduction of the duty on foreign made agricultural implements, which was referred to in a former number of this Journal, is not likely to affect to any great extent the importation of a more modern type of machinery than is at present in use by the peasantry of the country, since the Trans-Caucasus is not an essentially grain growing country, and the localities in which cereals are raised to any extent, viz., the governments

* The "family" here implies a collection of persons who exploit, or are enumerated as exploiting, in common one or several parcels of land. These persons may not all be blood relations ; some of them may even be domiciled hundreds of miles from the holding.

of Tiflis, Elizavetpol, Erivan, etc., are too backward in their means of communication to allow of the easy locomotion of bulky machinery along roads which are little better than cattle tracks. A further obstacle in the way of the introduction of proper machinery for agricultural purposes is the impecunious condition of a large proportion of the landlords and the ignorance of the peasantry. Nevertheless, Mr. Consul Stevens is inclined to favour the opinion that ploughs of various descriptions, specially adapted for ploughing stony soils in the plains, for ploughing operations on both moderate and steep mountain slopes, over irregular surfaces and other kinds of difficult country, could be sold to advantage, provided that some competent person accompanied them in order to teach the natives the manner in which they should be used, and for this purpose he suggests Tiflis as the most suitable locality where a person of this kind could be profitably employed. Tiflis is the capital of the Trans-Caucasus, and a point of concentration at some time of the year or other for a large number of persons belonging to the agricultural classes, who visit that town in order to make their annual purchases, and to transact other business in connection with their landed properties. The ploughs, however, should not be very costly. Something in the style of the ploughs imported into South Russia, and not costing more than about 12 to 15 r. (25s. 6d. to 32s.), delivered in Tiflis, for wooden beam ploughs with cast-iron shares, or 18 to 20 r. (38s. to 42s. 6d.) for iron ploughs, would probably find buyers.

[Foreign Office Report, Annual Series, No. 2198. Price 1d.]

SKIM-MILK AS FOOD FOR POULTRY.

A bulletin issued by the United States Department of Agriculture contains some observations on the employment of skim-milk for feeding purposes, and especially as a food for chickens. Skim-milk, it is remarked, is a farm product the food value of which is not fully appreciated. It is not generally realised that milk loses little in actual food value by skimming. It is true that most of the fat is removed in

the cream, but the most valuable food constituents, viz., nitrogenous substances, are left behind in the skim-milk, which contains much nutritive material in a form which is, as a rule, easily digested. Its composition is such that it may be substituted for part of the grain food of calves, pigs, and chickens with benefit and profit.

At the Experiment Station of Indiana experiments have been made in the use of skim milk for young chickens. Two uniform lots of ten chickens each, five Plymouth Rocks and five Houdans, four to six weeks old, were fed from July 11 to September 5, under identical conditions, except that one lot received, in addition to the food given to the other, all the skim-milk they would take. It was found that the lot receiving skim-milk ate more of the mixed food and made a more rapid and satisfactory gain than the lot which did not receive skim-milk. Milk-fed chickens made an average weekly gain in weight of about four and half ounces, while those receiving no milk put on about two and three-fifth ounces. The most rapid increase in weight occurred at those periods when the largest amounts of skim-milk were consumed. Skim-milk is considered especially valuable during hot, dry weather. It is important that the vessels which contain the milk should be scalded frequently to keep them perfectly clean.

THE RUSSIAN AGRICULTURAL BUDGET OF 1899.

In his report on the Budget of 1899 the Russian Minister of Finance states that the amount allocated to the Ministry of Agriculture and Crown Domains amounted to £3,945,000, as compared with £3,812,000 in 1898. The cost of administration is entered at £1,145,000, this sum being divided into £149,500 for central administration and £995,000 for local administration. Schools and model establishments for agriculture, forestry, and mining will absorb £224,200. Works of construction, material, labour, etc., are debited with £1,677,800. Provincial and communal land taxes in connection with State lands and forests will account for £467,300. The remaining £430,900 is made up of £189,000 for endowments,

£218,000 for sundry expenses, and an appropriation of £23,600 for the immediate requirements of 1900. The amount provided in the Budget for the State studs is £190,300.

[The above amounts have been converted into English money at the rate of one rouble = $2\frac{2}{15}$ shillings.]

THE BELGIAN POULTRY INDUSTRY.

In an article on this subject which was published three years ago in this Journal,* it was shown that the total number of eggs imported into Belgium in 1894 amounted to 463 millions, indicating an increase of 111 millions since 1892. According to the subsequent Belgian trade returns, the imports fell to 431 millions in the year 1895, but rose to 442 millions in 1896 and to 466 millions in 1897, *i.e.*, to 3 millions more than in 1894. These figures represent the total number of eggs imported into Belgium, and therefore include consignments in transit to other countries. The quantity imported for home consumption increased from 100 to 172 million eggs during the period 1892-97. The export statistics indicate similar features when the total figures are considered; viz., an increase from 319 millions in 1892 to 431 millions in 1894; then a decrease to 390 millions in 1895, the number again rising to 405 millions in 1896, and to 447 millions in 1897, *i.e.*, to about 16 millions more than in 1894. These figures also include foreign eggs which passed through Belgium *en route* to other countries, particularly to England. It is interesting to observe that the number of Belgian eggs exported show a very large and almost continuous increase throughout the period, viz., 68 millions in 1892, 61 millions in 1893, 78 millions in 1894, 110 millions in 1895, 129 millions in 1896, and 153 millions in 1897.

If, therefore, the eggs which merely pass through the country be not considered, but those only which are included under the term "special commerce," it is observed that Belgium imports for her own consumption somewhat more than the number of eggs of home production exported.

* Vol. II., p. 408.

The excess of these imports amounted to 32 millions in 1892, to 42 millions in 1893, to 31 millions in 1894, to 41 millions in 1895, to 37 millions in 1896, and to 19 millions in 1897. If the two triennial periods, 1892-4 and 1895-7, be compared in this connection, it is found that while the imports of eggs for home consumption increased by 56 per cent., the exports of Belgian eggs increased by 90 per cent.

An interesting account of the progress which has been made in Belgium during recent years in the development of poultry breeding and rearing, and of the technical instruction on the subject, is contained in a recent report by the United States Consul at Ghent. This report also contains a description of several local varieties of fowls to which little attention was formerly given, but which are gradually becoming better known and popular in Belgium. The Consul states that a reaction has taken place as regards the Italian varieties which, about fifteen years ago, were introduced throughout the country with a view to obtaining a supply of eggs during the winter. It has been found that the Italian birds are of a wilder nature than the native fowls, that they frequently introduce diphtheria into the farmyard, that they become "worn out" in Belgium in two years, and that their meat, moreover, is tough.

There are more than twenty poultry societies in Belgium, and their object is mainly to improve the native breeds and increase their production. This is accomplished by the free distribution to the members of eggs for hatching, the organisation of shows, co-operative sales, and technical instruction. The Department of Agriculture also provides lectures to every "group" of poultry-breeders who express a desire for instruction, and it is remarked that the coops are much better kept than formerly, that much greater care is given to the nests, and that the food is much better prepared. Thus maize, formerly almost exclusively used as food at all seasons, is being replaced by a more varied diet, according to the time of year and its products—cooked potatoes mixed with grain and milk, served tepid in winter, buckwheat, barley, wheat, oats, and occasionally, in summer, hemp seed.

The fowls have also much improved as layers, and the

farmers have begun to understand that spring chickens lay in winter, while late birds and old hens yield small profits.

There are between 200 and 300 large poultry breeders in Belgium, and the number of fowls on their farms varies from 300 to 500, the larger poultry farms being situated in Northern Flanders and in the provinces of Liège and Hainault.

The disposal of the eggs through the agency of co-operative dairies has been adopted with satisfactory results. A paid agent collects the eggs once a week and tests them in the presence of the owner; ultimately they are packed in baskets and exported by the society.

GERMAN AGRICULTURAL INTERESTS.

In a report to the Foreign Office* upon the development of commercial, industrial, maritime, and traffic interests in Germany, 1871 to 1898, Mr. Gastrell, Commercial Attaché to Her Majesty's Embassy at Berlin, alludes to the changing relative importance of agriculture and industry as economic factors in the national development of Germany. Whereas in 1871 agricultural interests were paramount, it is the industrial interests that have undoubtedly predominated in recent years; moreover, the future of industry is assured, while that of agriculture is less promising. The change during the latter part of the period is fairly illustrated by the statistics in the censuses taken in 1882 and 1895, which show that, while the number of persons supported by agriculture had fallen from 425 to 357 per thousand of the whole population, the industrial class had increased from 355 to 391, and the commercial from 100 to 115.

The interests of the industrial and agricultural classes are sharply defined in Germany, and the agricultural party are dissatisfied with the working of the tariff treaties (of which several will expire in 1904), which, they say, unfairly benefit industry at the expense of farming, by admitting foreign grains at specially low duties in order to secure better

* Miscellaneous Series, No. 490, price 3½d.

markets abroad for industrial produce. It is now, however, understood that the claims of agriculture will receive full recognition when these treaties undergo revision in 1904.

LIGHT RAILWAYS IN GERMANY.

In contradistinction to the broad-gauge railways, which now almost entirely belong to the State, the light railways in Germany have always been, and remain, private enterprises, strongly supported by the agricultural party. In 1887-8 there were in the country 436 miles of such lines, with an expended capital of £1,805,300; and by 1896-7 this length had been increased to 818 miles, with a capital of £3,823,050. In the latter year the gross receipts were £362,250, and the expenses £243,150, leaving an excess of earnings over expenditure of £119,100, or a yield of 3.10 per cent. on the invested capital. Their rolling stock consisted of 284 engines, 747 passenger carriages, and 6,325 goods waggons. The number of "person-miles" conveyed in 1896-7 was 62,082,000, and of "ton-miles" of goods 37,398,000.

The light railways of Prussia are regulated by a law of July 28, 1892, which has in view the special object of attracting private capital to this useful agricultural undertaking. This has, of course, only taken place in such districts as afforded promise of a fair return on the money invested, which was not the case with lines started merely with the object of developing the adjoining lands. In the latter instance it was clear from the beginning that it was only possible to build such lines with certain help, hence the power given to the provinces to allocate part of their revenue to the furtherance of such railways. Although some provinces, such as Hanover and Westphalia, at once made extensive use of this power, it was not much employed elsewhere until State aid was actually given.

Under the Prussian laws it was expected that the railways would be built solely by private capital, and with pecuniary

assistance from various local associations ("Kommunalverbände"). In April, 1895, however, the Prussian Government came to their aid with a grant of £250,000, to which it added £400,000 in June, 1896, and a further £400,000 in June, 1897, making a total of £1,050,000 up to date. These sums were to be applied to create such light railways as were deemed necessary in the interests of the public, but which could not be built otherwise than with State aid, and only on condition of there being no reasonable prospect of private companies obtaining a fair return on the capital to be invested. Up to 1897 some £350,000 had been granted or promised in different forms of subsidy, and these grants were made to railways having an aggregate length of 625 miles. In only one case, apparently, have these subsidies been accorded without stipulating for a return of interest.

The agricultural party contend that these narrow-gauge lines are very necessary to develop the agricultural resources of the country, and should form an important part of home politics. They urge, that, to a great extent, industries follow the broad-gauge lines, but that this is not possible in the case of farm produce, which must be carried by light railways in order to quicken the latent possibilities of agriculture.

[“Development of Commercial, Industrial, Maritime, and Traffic Interests in Germany, 1871-1898. Foreign Office Report, Miscellaneous Series, No. 490. Price 3½d.]

DISINFECTION OF HIDES EXPORTED TO THE UNITED STATES.

The Board have received through the Foreign Office a copy of a circular, issued on January 23rd last by the Division of Customs of the Treasury Department at Washington, which relates to the disinfection of hides of neat cattle shipped to the United States.

The present document refers to a previous circular of November 22nd, 1895, which provided for the disinfection of hides of neat cattle, other than those which have been arsenic cured or dry salted, when imported from the countries of Europe, Asia, Africa, Australia, and South America, and

further directed that hides of neat cattle, other than dry salted or arsenic cured, the product of the countries above named, required disinfection wherever they were shipped *via* the ports of any other country; and that hides, other than dry salted or arsenic cured, the product of any country not named above, if trans-shipped and actually landed at ports in any of the countries named required disinfection.

It is now stated that it has been represented to the Treasury Department that great injury results to moist hides by the process of disinfection prescribed by the above circular; and, as hides stripped from cattle at abattoirs are presumably in a condition not requiring disinfection, it is now directed that, so far as the countries of Norway, Sweden, and Great Britain are concerned, entry may be allowed of moist hides imported direct therefrom without disinfection, provided the invoice contain the declaration of the shipper that the hides are the product of such countries and were stripped from cattle in those countries, and that a certificate be also produced from the official veterinarian to the effect that the hides were taken from perfectly healthy cattle.

DANISH AGRICULTURAL LOAN SOCIETIES.

The French *Bulletin des Séances de la Société Nationale d'Agriculture* for December, 1898, contains an account, contributed by M. Roeder, of the provisions made in Denmark by the law of 26th March, 1897, to enable agriculturists to procure capital at a low rate of interest, for working their farms. The procedure enjoined under this measure is as follows.

A demand for the formation of such a society must be sent in by not less than fifty proprietors, owning at least 500 head of cattle, to the General Council of the province which nominates from among them a president and four members of council; the latter only serve provisionally until a council can be duly elected at a general meeting. At this general meeting, also, the statutes are drawn up for sanction by the Government. These statutes must, if the society is to

benefit under the law, contain certain provisions of which the following are the more important.

The sole object of the society is to lend money to its members in order to defray the current expenses of farming. Members may not belong to a similar loan society. The total amount which a member can borrow is determined by the council, and is based upon the normal number of cattle which his farm can support, but the members are free to fix their "borrowing capacity" at a lower sum. Members on joining pay 1 krone (about 1s. 1½d.) per head of cattle to the reserve fund; this sum bears no interest. The sum to be borrowed by any member may not exceed 56s. per head of cattle, or £167 in all. The amount of the loan is determined by the administration. The loan must be repaid in nine months; additional sums may be granted up to the above-mentioned limit, but with this exception no fresh loan will be granted within a month after repayment of the previous one. The money is lent upon a simple bond. The rate of interest must be the same for all the members, and may not exceed 4½ per cent. per annum. Any profit during the year goes to the reserve fund; any loss is defrayed by the members, according to their borrowing capacity, up to 50 öre (6¾d.) per head of cattle, any further deficiency being met out of the reserve fund. The reserve fund must not exceed 11s. per head of cattle; a surplus beyond this amount must be treated as capital, and the interest utilised in reducing the rate charged to members. Members can withdraw from the society at any time, remaining, of course, liable for any loans not repaid; but their entrance money is not returned, except in case of death, or unless the society is wound up. The society's funds must be deposited in a savings or other bank. The statutes cannot be modified without the consent of the Minister of Agriculture, and the society is subject to his inspection. The dissolution of a society must be voted at two general meetings, at fifteen days' interval, by a majority of the whole number of members.

Such loan societies can borrow from the State a circulating capital, not exceeding 33s. 4d. per head of cattle, at 3 per cent. per annum. This loan must be repaid if the society

ceases operations, and in any case ten years after the law comes into force. Members are liable for its repayment in proportion to their borrowing capacity. The total to be lent may not exceed £277,777. Bonds of members are exempt from stamp duty. Provision is made in the Budget for the inspection of societies, which is organised by the Minister of Agriculture.

AGRICULTURAL EXPORTS OF SERVIA.

In a report on the trade and commerce of Servia, Mr. Consul R. Macdonald states that the exports of agricultural and garden produce from that country in 1897 were valued at £865,000, or £72,068 less than in 1896, and that this sum represents over 38 per cent. of the value of the entire export trade of Servia.

The exports of cereals, which amounted to £320,000, included 137,785 quarters of wheat and 126,276 quarters of oats. The harvest of 1897 having been a total failure, the exports of grain consisted entirely of the produce of the 1896 harvest.

The exportation of live stock in 1897 was valued at £983,482, or £90,170 in excess of that for 1896, Austria-Hungary being a purchaser to the amount of £831,268. This trade, which covers over 40 per cent. of the whole exports of Servia, included 38,116 head of cattle valued at £293,930, a decrease, as compared with 1896, of 16,983 head and £132,411; sheep and goats to the value of £25,072, a decrease on 1896 of £11,338; and an export of 118,508 swine valued at £529,744, an increase in numbers and value of 70,387 head and £340,719.

In addition to the export of live swine Servia sold in 1897 carcasses of swine valued at £82,263, a falling-off as compared with 1896 of £95,906. The total net increase in the value of swine (alive and slaughtered) in 1897 was £244,813.

Other exports in 1897 were poultry, £13,551; wine, £13,777; and hides, chiefly sheep and goat skins, £130,260.

Statistics were not available at the date of the report as to the area under cultivation in 1898, but those for 1897 show the acreage under cereals in that year to have been: wheat,

726,251; rye, 91,758; barley, 185,128; oats, 246,764; and maize, 1,107,713 acres.

The Servian plum crop of 1898, though very abundant, was inferior both in quality and amount to that of 1897, which was phenomenal in its abundance. In the latter year the exportation of dried plums was valued at £502,811, and of plum marmalade at £129,028. Lest the term marmalade should be misleading, this article of trade is described as a compound of fruit reduced to a squash or pulp by boiling. After the stones have been separated it is poured unsweetened into barrels and sold to agents at Buda Pesth, who are said to purchase it for Germany, where it is used as an article of food by the poorer classes.

[Foreign Office Report, Annual Series. No. 2207. Price 1½d.]

EXPORTS OF ITALIAN DAIRY PRODUCE.

According to the Italian Trade Returns it appears that the quantity of Italian butter exported to Great Britain in 1897 was about 31,500 cwts., and of cheese 42,900 cwts. These commodities are, for the most part, exported overland through other countries, chiefly through Belgium, and consequently the Annual Statements of Trade of the United Kingdom for 1897 show only 1,349 cwts. of butter and 1,892 cwts. of cheese as having been imported into this country from Italy.

The total exports of fresh and salt butter from Italy in 1897 were 93,600 cwts., and of cheese 173,400 cwts. The climate of Upper Italy is stated to be very suitable for cattle-breeding and butter-making, and the greater part of the butter exported is manufactured in the country to the north of the Po: Milan, Lodi, Codogno, and Pavia being the principal exporting centres. Co-operative dairy associations of small farmers exist in Italy to the number of 690; of these, 204 are in Lombardy, and 382 are in Venice. Many of these establishments are closed during the winter. Associations for the manufacture of cheese ("fromageries") have also been formed; one of these, situated in the Province

of Bellune, has a membership of 1,300 farmers, distributed throughout fourteen communes. In addition to these co-operative societies, there are numerous large dairy farms owned by private individuals. On these farms, which manipulate from 2,000 to 3,000 gallons of milk per day, butter for export is the chief production.

MILLING IN ARGENTINA.

According to a report by M. C. Wiener, who was commissioned by the French Ministry of Foreign Affairs to study the resources and commerce of the Argentine Republic, Buenos Ayres first exported wheat-flour in 1597. This consignment went to Brazil, and the trade appears to have continued during the next two centuries, until the declaration of independence in Argentina; after which event population increased more rapidly than production, and the country was obliged to import flour.

At the end of the eighteenth century nine flour mills are known to have been in existence in the country, and thereafter each succeeding decade witnessed a constantly increasing addition to the number. Sixty-three were constructed in 1861-70; 108 in 1871-80; 173 in 1881-90; while in the following five years a further 110 were built. The total in operation in 1895, including those of which the date of construction is unknown, amounted to 659.

Rather less than half of these (315) are in the hands of foreigners, principally Italians, who are supposed to own 126 of the total. The foreign owners are chiefly to be found in the coast provinces, and are there four times as numerous as the Argentine proprietors; in the interior the national element predominates. There were 234 steam mills, 17 steam and water mills, 303 water mills, and 105 horse mills. Until 1880 mill stones only were used, but cylinders are now to be found in nearly 300.

It is calculated that the milling industry could deal with nearly two million tons of wheat in the course of the year. The quantity actually dealt with in 1894 was roughly estimated

at 600,000 tons, producing nearly 375,000 tons of flour; the rate of extraction was thus about 64 per cent.

With the steady increase in the number of its mills, the Argentine Republic was eventually enabled, first to cover its own requirements of flour, and then to export a surplus. In 1876 some 7,000 tons of flour were imported, but in the following year the home production was equal to the consumption, and in 1878 over 7,000 tons were exported. Since the latter date, although the shipments were under 2,000 tons in the four following years, the country has not failed to export a greater or smaller quantity each year. From 1883 to 1889 the consignments abroad remained at a fairly constant level, fluctuating around 5,000 tons. In 1890 nearly 12,000 tons left the country, and the Argentine trade returns show that the amounts exported during subsequent years have been approximately as follows:—

In 1891, 6,900 tons	In 1895, 52,800 tons
„ 1892, 18,500 „	„ 1896, 50,700 „
„ 1893, 37,200 „	„ 1897, 40,600 „
„ 1894, 40,000 „	

Most of the flour, and practically the whole in 1896 and 1897, was taken by Brazil. In the first four years of the present decade Paraguay annually took a couple of thousand tons, and Belgium usually about the same quantity; while in 1895, 3,000 tons were, exceptionally, sent to Great Britain.

The walnut is cultivated to a considerable extent in Southern Italy; but the acreage of the crop is not known, inasmuch as the tree is grown among the vines and fruit trees rather than grouped in “orchards,” except in the district of Sorrento. Considerable quantities of the nut are exported each year to England and the United States. The tree appears to grow best in good and deep garden soil, and in the climate of Southern Italy it begins to yield fruit in its tenth year. It is in full bearing at twenty years of age, and should then continue to yield about 50 lbs. of nuts per annum. The tree is hardy, and does not require irrigation.

Italian Walnuts.

The fruit is ripe in September, and when gathered requires to be seasoned by ventilation and exposure to the sun's rays. An excellent crop was secured in the past year, and shipped in time to reach England before the Christmas holidays, when the demand is greatest. The principal seat of export is from the little roadstead of Piano di Sorrento.

[Foreign Office Report, Annual Series. No. 2,204. Price 2d.]

From an account of results obtained upon the experimental plots arranged by the Congested Districts Board, Ireland, to test the efficacy of lime as a preventive of "finger and toe" in turnips, it appears that although the plots failed in some cases to afford reliable information, yet on the majority of the plots the application of lime to the land during the winter proved distinctly efficacious in mitigating this disease, which is so bad in several parts of the congested districts that many of the occupiers have given up the culture of turnips, believing that the prospects of obtaining a paying crop are too precarious. The "finger and toe" trials have been continued on other holdings during the present year, and it is believed that the lesson which they will convey will induce many of the more enlightened farmers residing in the districts in which the plots are situated to adopt the practice of liming. It is regretted that the cost of obtaining lime is usually so great in the districts in which "finger and toe" prevails that it deters farmers from applying it to the land.

A report issued by the Labour Department of the Board of Trade on Trade Unions [C.—9013] gives some particulars as to the unions of agricultural labourers in existence in the years 1892-1897. During these six years there have been

eleven such unions established, only three of which were in operation in 1897. In 1892 seven unions existed in England with 33,648 members, and in 1894 there were nine unions with 6,652 members. Since that date the decline of the movement has been very rapid, and in 1897 there were only two English unions, with a membership of 269. In Scotland, however, the Ploughmen and Labourers' Union, which was started in 1895 had 2,390 members in 1897.

According to a report by Her Majesty's Consul-General at Warsaw the estimated production in 1898 of sugar beet in the nine Governments of Poland where beet is grown was some 20 per cent. inferior to that of the previous year, beet plantations having suffered in the past season, especially at the time of drawing from the sudden cold weather and snow which set in in October. In some districts work had then to be abandoned, as the beet was frozen on the fields, which caused considerable loss. In view of the partial failure of last year's crop the price of sugar began to go up, the upward tendency of the market being very strong; but this did not continue long, as the Minister of Finance issued a decree by which 160,000 tons of the compulsory reserve stock was put on the market free of excise. The total area planted with sugar beet in the nine Governments in 1898 was 115,931 acres, compared with 108,805 acres in the previous year; but the number of sugar factories remained unchanged at 43. The estimated yield of sugar from the season of 1898 was 2,107,007 cwts. The largest area under the crop is in the Government of Warsaw, where 56,827 acres were planted in 1898; Lublin followed next with 18,238 acres. The number of sugar factories in these two Governments was 20 and 7 respectively.

According to a report by H.M. Consul-General at Warsaw, never was the scarcity of farm labourers more felt in the Kingdom of Poland than in 1898, and never before had it caused so much loss to farmers. Labourers were not only difficult to get at all, but the harvest of winter grains, which had been delayed by the weather, coincided with that of the spring sowings, and so rendered a larger number of labourers necessary at one time than usual just when they were particularly difficult to find. The want of hands was especially felt in the industrial Governments, in large towns, and near the German and Austrian frontiers. Peasants find it more advantageous to work in factories, where the work is continuous, or as bricklayers or paviours than to work in the fields, or, if they do so, prefer to go abroad where wages are considerably higher for farm work. This being the case, and a sufficiency of farm hands being more difficult to get each year, various measures have been proposed to remedy the evil. It has been proposed, for instance, to try to get the Government to change the passport regulations so as to make it more difficult for peasants to go abroad to work. Another proposal, which seems the only feasible solution of the difficulty, is to extend considerably the use of agricultural machinery, in order to be as independent as possible of human labour. The difficulty will be much greater in future years if, as is feared, the soldiers who are usually allowed to engage themselves as labourers are not allowed another year to do so, and it seems probable that such will be the case, as permission for them to do so was refused this year in Podolia and Volhynia. One result of such a measure would be a considerable rise of wages, which would chiefly affect beet and potato planters.

The Forest Preservation Act, which is being gradually introduced throughout the whole of the Russian empire since 1888, came into force in Poland on July 18, 1898. The object of this measure is, H.M. Consul-General at Warsaw states, to prevent the rapid destruction of forests which has

**Preservation of
Russian Forests.**

been carried out on a very large scale during the last ten or fifteen years. Forest owners, however, derived but little profit by this destruction, as the timber trade is carried on by Jews who, profiting by the frequent financial embarrassments of the landed proprietors, as a rule succeeded in getting more money out of the sale of the wood alone than they had paid for both the timber and the land it stood on. This new law will, it is believed, be followed by a rise in the price of timber, and will contribute to raise also the price of land, of which, however, the market price may be at present a little lower than its real value. This Act will be of special importance to the four governments of Lithuania, as there the forests are very dense, the exploitation of them until recently having been very difficult owing to the want of roads or railways; nevertheless the forests have been cut down in all directions, and there has been a rise in the price of forests of quite 100 per cent. during the past six years.

According to a report of the Ontario Bureau of Industries, the dairying industry in the Province was fairly prosperous in 1898, notwithstanding the drawback of low

**Dairying in
Ontario.**

prices for cheese, one result of which was that more attention is being paid in most localities to butter-making. Better prices were as a rule obtained for butter than in the previous season, and there is said to have been a steady improvement in quality. There is, it seems, a tendency towards combining the two branches of dairying by carrying on butter-making during the winter in cheese factories. One reason why many farmers in Ontario now accord a preference to butter is that it offers the obvious advantage, as compared with cheese manufacture, of leaving them a supply of skim-milk available for young stock. Much divergence of opinion prevails in the Province as to the best breeds of milch cows. The Durham strain is stated to be by far the most popular as an "all round" breed, and Western farmers who combine

dairying with stock-raising for the market very generally give the Shorthorn the preference. In the dairying counties of the eastern section, however, where the beef-making qualities of cattle are less regarded, the Ayrshire is accorded the first place, the Durham grades coming next in favour, while Holsteins and Jerseys are more numerous than in the West.

According to official Swedish statistics, the total butter exports from Sweden during the year 1898 were 50,593,972 lb., against 52,373,325 lb. in 1897. Of this total quantity about 33,000,000 lb. were shipped to England, while the remainder, 17,600,000 lb., went almost exclusively to Denmark, from whence most of it was reshipped to English ports.

REPORTS ON FOREIGN CROPS.

CROPS IN THE UNITED STATES.

The final report of the Statistician of the United States Department of Agriculture, issued in January last, gives the following particulars as to the acreage and production of the principal crops in 1898 in that country:—

Crop.	Area.		Production.	
	1898.	1897.	1898.	1897.
	Acres.	Acres.	Winchester Bushels.	Winchester Bushels.
Wheat - -	44,055,278	39,465,066	675,148,705	530,149,168
Maize - -	77,721,781	80,095,051	1,924,184,660	1,902,967,933
Oats - -	25,777,110	25,730,375	730,905,643	698,767,809
Rye - -	1,643,207	1,703,561	25,657,522	27,363,324
Barley - -	2,583,125	2,719,116	55,792,257	66,685,127
Buckwheat -	678,332	717,836	11,721,927	14,997,451
Potatoes -	2,557,729	2,534,577	192,306,338	164,015,964
			Tons.	Tons.
Hay - -	42,780,827	42,426,770	66,376,920	60,664,876]

The acreage under wheat, which, as already noted, has been the subject of a special inquiry, is thus 4,500,000 acres more than in 1897, and exceeds by over four million acres the highest hitherto recorded, in 1891, in which year the area was estimated to be not quite 40,000,000 acres. The production also represents the heaviest total harvested in the States, and is put at over sixty million bushels more than in 1891, the only occasion when the production was calculated to have exceeded 600,000,000 bushels. The average

yield works out at 15·3 Winchester bushels per acre, or about the same as in 1891.

ARGENTINE WHEAT CROP OF 1898-99.

According to reports published in *La Agricultura*, the harvesting of the Argentine wheat crop was delayed early in January by heavy rain storms, and in some districts the grain was damaged. Later in the month reports indicated, however, that the crop had yielded abundantly, and that threshing was in full progress throughout the Republic.

The quantity of wheat available for export, after meeting the needs of the population and making provision for next season's seed, was estimated at between 1,500,000 and 2,000,000 tons.

CROPS IN INDIA.

The first general memorandum, dated December 24, 1898, of the Statistical Bureau of the Government of India on the Indian wheat crop stated that the first forecasts of the wheat crop were, on the whole, fairly favourable. Owing to deficient rainfall a shrinkage in last year's area of half a million acres or 6 per cent. was anticipated for the Panjab, but the acreage sown was still above the average. The area in the North-Western Provinces and Oudh was expected to be 10 per cent. above the average, and the continuance of the favourable condition of the crop only depended on the timely arrival of the winter rains. In Sind, where the condition of the crop was good, a considerable falling-off in the acreage was expected owing to low inundation. In Bombay the conditions varied: in Gujarat the area would probably reach the average; but in the Deccan and Karnatak it would be considerably below the average, though in excess of the low figure for last year. The condition of the crop varied from fair to good, but rain was needed for the dry crop in Ahmednagar and South Deccan. A largely increased area had been sown in Berar, but rain was much needed, and

without it the out-turn was not expected to exceed 50 per cent. of a normal crop. In the northern and eastern districts of the Central Provinces the cultivation had increased, and the condition of the crop was generally good, but in the south, where more rain was urgently needed, the condition was poor.

CROPS IN FRANCE.

The French Ministry of Agriculture have compiled from the reports of the several departmental professors of agriculture, a tabular statement respecting the acreage and condition of the crops of wheat and rye in France in January last, the information being made public in the *Journal Officiel* of the 5th February.

The acreage sown to wheat is stated to be from 6 to 10 per cent. higher than last year in two departments; twenty departments have increased their acreage by 5 per cent. or less; forty-eight departments have the same acreage as last year; while in the remaining seventeen the decrease in acreage varies from 1 to 13 per cent. The condition of the growing crops is described as very good in thirteen department, good in sixty-seven, and fairly good in seven.

The acreage under rye is reported to be less by 1 to 20 per cent. than last year in thirty-one departments; in fifty-three departments the acreage is the same; and only one shows an increase (of 20 per cent.). In twenty-one departments the condition of rye was reported as very good, in fifty-seven as good, and in seven as fairly good.

HARVEST OF 1898-99 IN NEW SOUTH WALES.

The Government statistician of New South Wales has recently published his estimates of the area under crops in New South Wales in 1898-99, and it would appear that the steady increase in the cultivated area, which has been

observable each year since 1891, was well maintained. The area under crops in 1891 was 846,383 acres, in 1897 it had increased to 1,821,829 acres, and a further addition of 223,800 acres took place in 1898, making a total at the time of this return of 2,045,600 acres under crops, exclusive of the area under artificially sown grasses. This rapid extension of agriculture has been due almost entirely to the greater attention paid to the cultivation of wheat, a little over one million acres out of the total increase of 1,200,000 acres since 1891 being due to this cause.

With regard to the estimated area and yield for the present season 1898-99, the total area is put at 1,467,000 acres, or about 260,000 acres more than last year. Of this, however, some 342,000 acres were cut for hay, so that the net area under wheat for grain was 1,125,300 acres. The production is estimated at 9,072,000 bushels against 10,560,000 bushels last year. The yield per acre was the lowest since 1888, being only 8.1 bushels, as compared with 10.6 for 1897 and 10.8 for the last six years.

The decline in production was by no means equally distributed throughout the colony. On the western slopes the yield is returned as being only 5.8 bushels over an area of 601,800 acres, and the shortage in this district is estimated at over 1,200,000 bushels. The crops throughout the northern tableland and its western slope are lighter than last year, and much below the general average. Towards the Queensland border the harvest has been a partial failure. In the central tableland the harvest was a success and the yield above the average. Taking the colony as a whole, after allowing for the seed requirements of next year, the quantity of wheat available for food may be set down at 7,000,000 to 7,500,000 bushels.

THE BELGIAN HARVEST OF 1898.

The following information was published in the *Moniteur Belge* of December 31, 1898.

The reports furnished by the provincial agricultural com-

missions indicate that the Belgian harvest of 1898 was good as regards the quality and quantity of the crops.

The following table shows the produce per acre of the principal cereals during the last eight years :—

Year.	Bushels per Acre.			
	Wheat.	Rye.	Barley.	Oats.
1898 - - - -	30·6	28·9	39·0	52·3
1897 - - - -	26·0	28·2	35·3	46·7
1896 - - - -	29·9	30·8	41·9	41·3
1895 - - - -	28·0	29·4	41·4	47·4
1894 - - - -	27·5	29·5	39·2	44·7
1893 - - - -	26·6	27·1	37·0	32·7
1892 - - - -	29·7	31·4	42·0	42·3
1891 - - - -	23·4	22·3	33·4	46·8

The latest available acreage statistics of Belgium relate to the year 1895, when the wheat area amounted to 445,531 acres. If this figure be also taken to represent the extent of the crop in 1898, the total yield of wheat was 13,633,000 bushels of 61·6 lbs., compared with 11,584,000 in the previous year, *i.e.*, showing an increased yield of 2,049,000 bushels.

The potato crop was of good quality throughout the country, and the average yield was estimated at 139 cwts. per acre, compared with 119 cwts. in 1897; 118 cwts. in 1896; 137 cwts. in 1895; 109 cwts. in 1894; 164 cwts. in 1893; and 185 cwts. in 1892.

The hay crop gave an average yield of 2 tons 0½ cwt. per acre; the first cut was abundant and of good quality, but the second cut was of medium quality and yield.

Mangolds and carrots gave unsatisfactory results; the former yielded 14 tons 19 cwts. per acre, the latter 8 tons 4½ cwts. as a main crop, and 4 tons 6 cwts. as a catchcrop. The yield of turnips was bad, and much inferior to that of former years; the main crop gave 9 tons 1 cwt. per acre, and the second crop 6 tons 12 cwts. Sugar beet was very rich in juice, but very poor in quantity, *viz.*, 10 tons 3 cwts. per acre, compared with 11 tons 9 cwts. in 1897, and 12 tons 18 cwts. in 1896.

The flax crop, except in West Flanders, was a fair average one as regards quantity and quality.

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THE POLISH HARVEST OF 1898.

In a report on the results of the harvest of 1898 in Poland, Her Majesty's Consul-General at Warsaw draws attention to what he describes as two very remarkable features in the agriculture of that country. The first is that, although a good crop after an inferior one may make the reverse appear to be the case, the amount of grain grown in Poland is actually diminishing, owing to the fact that the large estates are being gradually parcelled out into small holdings in the hands of peasant farmers, whose crops, grown with an inferior system of agriculture, are not so good as those grown on the same ground by large landed proprietors with an improved system.

The other feature is that, although Russia is a grain exporting country, the production of cereals in the ten Polish Governments is not sufficient to supply the needs of the population of Poland for whom grain has to be brought from other parts, so that the price of grain in Poland is higher than elsewhere.

The produce of the different cereals in Poland and Lithuania in 1898 was estimated as follows, and taking the diminution of production in Poland, explained above, into consideration may be considered a good yield :

CROP.	Poland.	Lithuania.
	<i>Quarters.</i>	<i>Quarters.</i>
Winter Wheat - - - - -	3,083,625	569,775
Spring Wheat - - - - -	15,525	115,875
Barley - - - - -	2,483,100	1,818,100
Oats - - - - -	6,218,200	4,703,063
Rye - - - - -	8,312,250	6,819,525
Buckwheat - - - - -	100,000	141,165
Millet - - - - -	50,000	—
Peas - - - - -	792,900	491,950

The crop the success or failure of which affects the well-being of all classes in Poland is not, as in Russia proper, rye, but potatoes, which form almost the sole food of the labouring classes, and supply also a large part of the income of the farmers who grow them for sale to the distillers.

A failure of the potato crop means, therefore, famine to

the poor and heavy loss to the rich. Last year the potato crop was more or less of a failure. At first alarmist reports prevailed and there were apprehensions that such a famine might be experienced from the failure of potatoes as prevailed in Eastern European Russia from the failure of cereals. Happily, however, although the crop was undoubtedly everywhere bad, and in many places a failure, the results were not so disastrous as to cause actual suffering amongst the poor, except in certain limited localities, although it was feared that they would be hard put to it to get through winter on account of the great rise in price. Still it was expected that serious losses would be incurred by those who grow potatoes for sale, although, on the other hand, the good grain harvest and high prices of cereals might afford a certain measure of compensation.

The yield of potatoes in Poland is on an average about 125 million cwt., but the out-turn of the past year would, it was feared, yield not more than two-thirds of that quantity.

THE SWEDISH HARVEST OF 1898.

The estimated returns of the harvest of 1898 in Sweden have been issued by the Swedish Statistical Bureau, who state that the results may be regarded as "fairly good." The yields of wheat, barley, and mixed corn, and especially of oats and hay, were very large, and the quality of the crops very satisfactory. With regard to potatoes the production was much below the average, and the quality very inferior. The estimated produce of the principal crops is shown below.

Crop.	1898.	Average. 1888-1897.
	<i>Bushels.</i>	<i>Bushels.</i>
Wheat - - - - -	4,401,400	4,078,000
Rye - - - - -	20,805,100	21,387,300
Barley - - - - -	14,347,000	13,862,200
Oats - - - - -	68,239,600	60,638,600
Mixed Corn - - - - -	10,233,300	8,397,400
Peas - - - - -	1,133,800	1,453,600
Beans - - - - -	233,750	201,000
Vetches - - - - -	650,400	698,800
Potatoes - - - - -	37,331,500	52,769,500

THE WHEAT HARVEST OF AUSTRALASIA IN 1897-98.

The areas of the land under wheat in the various Australasian colonies have been brought together in the following table, together with the production for the past two years. The areas do not include wheat cut for hay.

Colony.	Area.		Produce.	
	1897-98	1896-97	1897-98	1896-97
	<i>Acres.</i>	<i>Acres.</i>	<i>Bushels.</i>	<i>Bushels.</i>
Victoria - - -	1,657,400	1,580,600	10,580,200	7,091,000
New South Wales - -	993,300	866,100	10,560,100	8,853,400
South Australia - -	1,522,700	1,693,000	4,014,900	2,804,500
Queensland - - -	57,800	34,700	1,009,300	601,300
Western Australia - -	—	31,500	—	243,900
Tasmania - - -	85,900	64,650*	1,668,300	1,164,900*
New Zealand - - -	315,800	258,600	5,670,000	5,926,500

* In 1895-96.

It will be observed from the above table that the average yield of wheat per acre in the different colonies exhibits considerable variations. In the three colonies of New Zealand, Queensland, and Tasmania the yield was from 17 to 23 bushels per acre. In New South Wales the yield was about 10 bushels, which may be regarded as an average crop; in Victoria it was 6·38 bushels in 1897-98, as against 4·49 bushels in the previous year, and in South Australia 2·64 bushels compared with 1·66. In the case of the two latter colonies the low yield is due to the severe drought: in Victoria the average yield for the past four years has been only 6·8 bushels, whilst in the preceding four years it was 10·7 bushels. In South Australia the average yield is from 5 to 7 bushels.

CROPS AND LIVE STOCK IN ONTARIO.

The official report of the Provincial Department of Agriculture on the result of the harvest in Ontario in 1898 states that the favourable accounts of the condition of the

autumn wheat given in the August report have been confirmed by the reports received in November. The final estimates of the yields of the crops based on actual thrashing returns are shown in the following table, together with the figures for the previous year.

Crop.	Acreage.		Produce.	
	1898.	1897.	1898.	1897.
	<i>Acres.</i>	<i>Acres.</i>	<i>Bushels.</i>	<i>Bushels.</i>
Autumn wheat - -	1,048,182	950,222	25,158,713	23,988,051
Spring wheat - -	389,205	323,305	6,873,785	4,868,101
Barley - - -	438,784	451,515	12,663,668	12,021,779
Oats - - - -	2,376,360	2,432,491	86,858,293	86,318,128
Rye - - - -	165,089	187,785	2,673,234	3,382,005
Buckwheat - -	150,394	151,669	2,373,645	3,464,186
Potatoes - - -	169,946	169,333	14,358,625	16,100,797

The area returned as orchard and garden land is 335,420 acres, and the number of apple trees of bearing age is estimated at 6,221,324, while there are 3,458,820 younger apple trees planted in orchards.

The total number of cattle enumerated in the province on July 1st, 1898, was 2,215,943, of which 965,021 were milch cows; the number of sheep was 1,677,014, of swine 1,642,787 and of poultry of all kinds 9,084,273; the numbers of cattle, swine, and poultry have shown a steady increase for some years past, but the number of sheep has declined.

The wool clip of last year was 5,104,686 lbs. as compared with 5,139,984 lbs. in 1897. The number of colonies of bees increased from 166,811 in 1897 to 190,080 in 1898.

CROPS AND LIVE STOCK IN MANITOBA.

Owing to the unfavourable weather experienced at the harvesting season the actual yields of the principal grains in Manitoba in 1898, as ascertained from the returns made in December last, were less than was anticipated from the preliminary estimates.

The following table gives the final result of the harvest, together with the figures for 1897 :—

Crop.	Area.		Produce	
	1898.	1897.	1898.	1897.
	<i>Acres.</i>	<i>Acres.</i>	<i>Bushels.</i>	<i>Bushels.</i>
Wheat - - - - -	1,488,232	1,290,882	25,313,745	18,261,950
Oats - - - - -	514,824	468,141	17,308,252	10,629,513
Barley - - - - -	158,058	153,266	4,277,927	3,183,602
Potatoes - - - - -	19,791	13,576	3,253,038	2,033,298
Roots - - - - -	8,448	6,130	2,471,715	1,220,070

The yield of flax was 350,000 bushels ; of rye 63,860 bushels ; and of peas 31,880 bushels.

The number of live stock in Manitoba, according to the latest statistics, included 227,097 cattle, 32,053 sheep, and 69,648 swine. These figures show a decrease in sheep and swine, and it is stated that the high price of wheat in 1897 and 1898, and the scarcity of coarse grains, were prejudicial to the hog industry.

The season was a favourable one for the manufacture of cheese and butter.

CROPS AND LIVE STOCK IN CAPE COLONY.

The results of the harvest of Cape Colony for the year ending May 31st, 1898, have been published in the Agricultural and Live Stock Returns of that Colony, and the yields of the principal crops are given in the table below (excluding Transkei and Bechuanaland).

With regard to live stock, cattle show a very large decrease, the number in 1898 being returned at 855,326 head as compared with 1,231,147 in the preceding year. Sheep also decreased from 11,851,477 to 10,780,609, the decline being

chiefly noticeable amongst the merinos, which have fallen from 8,914,753 in 1894 to 7,187,520 in the past year. Angora and other goats showed an increase to 4,510,106. The production of wool was 34,000,000 lbs., and of mohair nearly 8,000,000 lbs.

Crop.	1897-8.	1896-7.
	<i>Bushels.</i>	<i>Bushels.</i>
Wheat - - - - -	1,880,232	2,069,037
Barley - - - - -	898,362	760,395
Oats - - - - -	1,425,690	881,643
Rye - - - - -	287,466	254,220
Maize - - - - -	908,379	1,231,020
Potatoes - - - - -	1,036,869	904,788
	<i>Lbs.</i>	<i>Lbs.</i>
Tobacco - - - - -	3,767,998	6,156,505

PRICES OF LIVE STOCK AS RETURNED UNDER THE WEIGHING OF CATTLE ACT.

The complete returns of prices obtained under the Markets and Fairs (Weighing of Cattle) Act, 1891, are now available for the year 1898. Besides the customary statements for the last quarter of the year, a summary of the returns received from each of the twenty-one scheduled places during the whole twelve months is given on page 544.

So far as the statistics for the last quarter of 1898 compare with those for the corresponding period of 1897, a larger number of stock is shown as entering the markets, beyond the increase occasioned by the inclusion of the two markets of Carlisle and Falkirk, which were added on January 1st, 1898. The relative number of cattle weighed, and of those weighed and priced, also showed an appreciable increase in the last quarter of 1898 when compared with that of 1897. At the twelve places from which sufficient data as to prices were available for comparison the average price of first quality beef ranged from 31s. 4d. per cwt. at Liverpool to 36s. 6d. per cwt. in London. At each of these twelve markets, with one exception, the price both of first and second quality cattle in the "Christmas quarter" was lower in 1898 than in the same months of 1897. The quotations for third quality beasts, as usual, present more irregular comparisons.

Turning to the figures for the whole year 1898, it is of interest to compare them with those relating to the five preceding years for which similar statistics have now been

collected under the Act of 1891. The following table shows, for cattle, sheep, and pigs respectively, the numbers entering, weighed, and priced at all the places scheduled. It has to be remembered that the addition in 1898 of Carlisle and Falkirk to some extent disturbs the comparison by adding 73,833 cattle, 345,409 sheep, and 15,885 pigs to the numbers entering the markets, and 11,385 cattle to the number weighed and priced. After making allowance for this, however, it appears that the number of cattle exposed at the scheduled markets in 1898 was larger than in the three preceding years, but slightly less than in 1893 and 1894. In 1893, however, the total number of cattle in Great Britain was larger than it has since been, and it is to be noted that the returns under the Weighing of Cattle Act in the next few years reflect to some extent the diminution which occurred in the cattle of Great Britain generally.

Animals.	1898.	1897.	1896.	1895.	1894.	1893.
CATTLE :	No.	No.	No.	No.	No.	No.
Entering markets - - -	1,263,991	1,115,133	1,100,014	1,135,149	1,203,533	1,219,208
Weighed - - -	138,652	111,767	99,184	103,033	95,344	92,492
Prices returned - - -	124,197	100,371	97,537	23,403	84,593	84,403
Prices returned with quality distinguished	102,299	78,329	75,014	,072	58,559	57,323
SHEEP :						
Entering markets - - -	4,691,619	4,194,310	4,309,943	4,330,256	4,649,277	4,854,732
Weighed - - -	49,953	41,969	41,685	34,886	39,210	38,177
Prices returned with quality distinguished	40,460	36,692	35,048	23,577	26,072	28,180
SWINE :						
Entering markets - - -	363,370	211,613	232,344	233,189	139,187	191,376
Weighed - - -	1,614	2,333	4,585	, 03	2,498	1,450
Prices returned - - -	1,437	1,368	1,686	1,226	523	401
Prices returned with quality distinguished	1,437	1,368	1,686	17	50	6

Note :—The figures for 1898 include the returns from Carlisle and Falkirk.

So also in the case of sheep, after making the necessary deduction for Carlisle and Falkirk, the numbers returned as entering the scheduled markets in 1898, while exceeding the numbers in the three preceding years, fell below those of 1893 and 1894. The reduction by nearly 1,500,000 of the number of sheep in the country between June, 1893, and June, 1894, accounts for the fact that the numbers offered for sale in the succeeding years were reduced, until last year the recovery shown by the Agricultural Returns had its natural effect on the returns from the live stock markets.

There are no doubt various circumstances affecting the number of stock marketed in a particular year, such, for instance, as effects of season, abundance or scarcity of keep, prices current, etc., while local conditions may reduce or augment the supply at one or more of the scheduled markets. An exact correspondence, therefore, between the number of stock offered at the twenty-one selected markets and the number returned on June 4 cannot always be expected, but it will be seen that a general relation may be established from the figures as given above.

The use of the weighbridge is shown to have increased, but the progress is slow over the country generally. The proportion of cattle weighed last year at all the scheduled places was within a fraction of 11 per cent., as compared with 10 per cent. in 1897, and the number for which prices were given was 8 per cent. of the cattle shown against 7 per cent. in the previous year. This increase, so far as it goes, is satisfactory, and even more so is the fact that complete price returns are now available for 102,299 individual transactions in cattle, or nearly twice as many as in 1893.

It still remains true that the weighbridge is far more popular in Scotland than in England. North of the Border the proportion of cattle weighed was 31·41 per cent., while at the English markets it was only 4·67 per cent., and the proportion of cattle for which prices were given was 23·67 per cent. and 3·29 per cent. respectively. It may be noted, however, that the relative increase in both cases in comparison with 1897 was slightly more in England than in Scotland. In England the largest number, both absolutely and relatively, of cattle weighed was at the Metropolitan Cattle Market, where the proportion of those exposed for sale which passed over the weighbridge was 18·34 per cent. At Shrewsbury 14 per cent., and at Liverpool and Carlisle a little over 12 per cent. of the numbers returned were weighed, but in the remaining English markets the proportion was very small; and at all but Leeds and Newcastle comparatively insignificant. At the six Scottish markets the proportions were very different. At Dundee no less than 76 per cent. of the total cattle entering the market were weighed, and at

Glasgow, where, according to the returns rendered, the weighbridge would seem to be least in favour, the proportion was $15\frac{1}{2}$ per cent. Fifteen of the markets showed an increase, though in most instances only slight, in the proportion of cattle weighed in 1898, as compared with 1897.

In the case of sheep and swine the weighbridge continues to be so rarely used that, statistically, the numbers weighed are of small value. It is still somewhat inexplicable that while 22,921 sheep were weighed at Aberdeen and 7,176 in London, in some markets not a single sheep was weighed, and in others the number was insignificant.

Curious inequalities of practice continue to be displayed at the different markets. While 14,324 out of 78,105 cattle were weighed in London, only 31 out of 89,080 were weighed at York. It would be of interest to know why more sheep than cattle were weighed at Leeds, while at Carlisle not a single sheep was put on the weighbridge, although it was used for 7,752 cattle. The difference of practice between Scotland and England remains the chief anomaly, the farmers, butchers, and dealers in the auction marts of Scotland being still much more ready to use the weighbridge than the frequenters of English markets. The returns show that the weighbridge has been found serviceable by a large number of buyers and sellers under a wide variety of conditions, and the gradual extension of its use indicates that those who have once adopted it do not as a rule relinquish it.

The most satisfactory feature of the returns for 1898 was the marked increase in the number both of cattle and sheep, for which prices, as well as weights, were given. The primary object of the Weighing of Cattle Act being to obtain records of prices, it is evident that only in so far as statements of the prices realised together with the description of the quality of the animals represented are obtained is the full advantage of the statute secured. From twelve of the scheduled markets sufficient data are now available to permit of the calculation of average prices for the year. The figures in the following table represent the actual prices at which the fat cattle enumerated were sold, calculated at per

stone of 14 lbs. and at per cwt., with the numbers on which the quotations were based:—

PLACES.	INFERIOR or Third Quality.			GOOD or Second Quality.			PRIME or First Quality.		
	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.
Carlisle - - -	2,640	s. d. 3 2 ³ / ₄	25 10	3,417	s. d. 3 8 ³ / ₄	29 10	1,695	s. d. 4 1 ¹ / ₄	32 10
Leeds - - -	39	3 6	28 0	225	3 8	29 4	1,367	4 0	32 0
Liverpool - - -	219	3 0	24 0	625	3 6	28 0	7,166	3 11 ³ / ₄	31 10
London - - -	37	3 1 ³ / ₄	25 2	2,141	4 0 ¹ / ₂	32 4	2,752	4 6 ³ / ₄	36 6
Newcastle - - -	66	3 3	26 0	305	3 8 ³ / ₄	29 10	1,932	4 2	33 4
Shrewsbury - - -	83	3 0 ³ / ₄	24 6	429	3 8 ³ / ₄	29 8	134	4 3 ¹ / ₄	34 2
Aberdeen - - -	4,795	2 11 ³ / ₄	23 10	10,954	3 11 ³ / ₄	31 8	7,336	4 4	34 8
Dundee - - -	1,044	3 4 ¹ / ₂	26 10	7,474	3 11	31 4	4,557	4 2 ³ / ₄	33 8
Edinburgh - - -	19	3 7 ¹ / ₂	28 10	13,025	4 1	32 8	1,321	4 3	34 0
Falkirk - - -	517	3 6 ¹ / ₂	28 2	1,710	3 11 ³ / ₄	31 10	1,466	4 3	34 0
Glasgow - - -	1,593	3 10 ³ / ₄	31 0	3,537	4 0 ¹ / ₂	32 2	6,087	4 2 ³ / ₄	33 10
Perth - - -	630	3 9 ¹ / ₂	30 2	2,012	4 0 ¹ / ₂	32 4	1,145	4 4	34 8

The prices for cattle of first quality ranged from 3s. 11³/₄d. per stone (31s. 10d. per cwt.) at Liverpool to 4s. 6³/₄d. per stone (36s. 6d. per cwt.) in London; and it will be seen that at eight of the markets the average price lay between 4s. 2d. and 4s. 4d. per stone (33s. 4d. to 34s. 8d. per cwt.). For second quality beasts the range was of exactly the same extent, being from 3s. 6d. per stone (28s. per cwt.) at Liverpool to 4s. 1d. per stone (32s. 8d. per cwt.) at Edinburgh. In the case of the third quality the range was wider—viz., from 2s. 11³/₄d. per stone (23s. 10d. per cwt.) at Aberdeen to 3s. 10³/₄d. per stone (31s. per cwt.) at Glasgow.

The prices of 1898 compared with those of 1897, stand as in the following table:—

PLACES.	INFERIOR or Third Quality.		GOOD or Second Quality.		PRIME or First Quality.	
	1898.	1897.	1898.	1897.	1898.	1897.
	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.
Carlisle - - -	25 10	—	29 10	—	32 10	—
Leeds - - -	28 0	27 8	29 4	30 4	32 0	32 4
Liverpool - - -	24 0	25 10	28 0	30 0	31 10	32 8
London - - -	25 2	28 4	32 4	33 8	36 6	38 10
Newcastle - - -	26 0	27 2	29 10	30 8	33 4	36 2
Shrewsbury - - -	24 6	25 4	29 8	30 6	34 2	34 6
Aberdeen - - -	23 10	24 8	31 8	33 0	34 8	36 0
Dundee - - -	26 10	27 6	31 4	32 6	33 8	35 2
Edinburgh - - -	28 10	—	32 8	33 10	34 0	35 8
Falkirk - - -	28 2	—	31 10	—	34 0	—
Glasgow - - -	31 0	30 8	32 2	32 10	33 10	35 10
Perth - - -	30 2	31 4	32 4	33 10	34 8	35 10

It is to be observed that at each of the markets, for which figures for both years are available, there was a fall in the value of cattle of first and second qualities, amounting in one case to as much as 2s. 10d. per cwt. For the animals classed as of third quality the tendency was not quite so uniform, though seven markets showed a decline, while only two showed a rise. Speaking generally, therefore, the fall in the price of beef during the past year was marked.

The fat cattle, to which the quotations above given refer, include all those for which both weight and price were returned. Included among them are always a certain number reported as being actually sold by live weight at an agreed rate per cwt. or per stone. This number in 1898 reached 13,031, thus largely exceeding the corresponding number in 1897, which was only 5,345. These were distributed among seven places, viz., Glasgow, Falkirk, Dundee, Edinburgh, London, Liverpool, and Newcastle, in the order named, more than one-third of the whole number being returned at Glasgow. This marked increase in the number of live weight sales would appear to indicate that the method so long advocated, and as yet so little used, is at length beginning seriously to find favour. In addition to the 13,031 fat stock thus disposed of, there were also 1,172 store cattle returned as having been sold by live weight at Edinburgh, Glasgow, and Leicester. The total number of store cattle returned as having been weighed and priced during the year was 6,608, of which over two-thirds were sold at Shrewsbury. The prices at which they were sold ranged from 4s. 3d. per stone (34s. per cwt.) at Shrewsbury to 3s. 1 $\frac{3}{4}$ d. per stone (25s. 2d. per cwt.) at Edinburgh.

The usual tables which have been previously referred to, giving the details for the fourth quarter of 1898, and the general table showing the numbers of stock entering, weighed, and priced, at each scheduled place during the whole year, are appended.

I.—Total number of animals entering, weighed, and priced at the Scheduled Places in Great Britain in the Fourth Quarter of 1898:—

Animals.	4th Quarter, 1898.	4th Quarter, 1897.	4th Quarter, 1896.
CATTLE:	No.	No.	No.
Entering markets - - - - -	402,639	350,807	342,981
Weighed - - - - -	41,821	29,386	29,664
Prices returned - - - - -	36,789	25,332	26,146
Prices returned with quality distinguished - - -	30,939	20,625	20,504
SHEEP:			
Entering markets - - - - -	1,139,635	949,744	1,010,925
Weighed - - - - -	9,229	7,632	7,411
Prices returned with quality distinguished - - -	7,400	6,100	6,266
SWINE:			
Entering markets - - - - -	130,581	93,750	65,498
Weighed - - - - -	488	831	865
Prices returned with quality distinguished - - -	488	513	255

NOTE.—The figures for 1898 include the returns from Carlisle and Falkirk.

II.—Prices of fat cattle at the undermentioned twelve places in the Fourth Quarter of 1898:—

PLACES.	INFERIOR or 3rd Quality.			GOOD or 2nd Quality.			PRIME or 1st Quality.		
	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.
Carlisle - -	751	s. 3 d. 3	s. 26 d. 0	723	s. 3 d. 8	s. 29 d. 10	433	s. 4 d. 2	s. 33 d. 4
Leeds - -	13	3 6	28 0	55	3 8	29 6	379	4 0	32 0
Liverpool - -	..	..	..	289	3 5	27 4	3674	3 11	31 4
London - -	11	3 4	27 2	500	3 11	31 8	870	4 6	36 6
Newcastle - -	16	3 3	26 2	135	3 8	29 6	247	4 2	33 8
Shrewsbury - -	..	..	..	..	..	..	..	..	..
Aberdeen - -	1296	2 10	23 0	3074	3 11	31 6	2371	4 4	34 10
Dundee - -	264	3 4	27 0	1677	3 11	31 8	1049	4 3	34 0
Edinburgh - -	..	..	..	3624	3 11	31 10	194	4 5	35 8
Falkirk - -	180	3 4	27 0	483	3 10	31 2	371	4 3	34 6
Glasgow - -	399	3 10	31 2	943	4 0	32 2	2485	4 2	33 10
Perth - -	158	3 9	30 2	366	4 1	32 8	281	4 4	34 10

III.—Comparative statement of the prices of fat cattle at the undermentioned twelve places in the Fourth Quarters of 1898 and 1897:—

PLACES.	INFERIOR or Third Quality.		GOOD or Second Quality.		PRIME or First Quality.	
	4th Qtr. 1898.	4th Qtr. 1897.	4th Qtr. 1898.	4th Qtr. 1897.	4th Qtr. 1898.	4th Qtr. 1897.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
Carlisle - -	s. 26 d. 0	—	s. 29 d. 10	—	s. 33 d. 4	—
Leeds - -	28 0	27 4	29 6	31 2	32 0	32 4
Liverpool - -	—	25 0	27 4	28 2	31 4	32 0
London - -	27 2	24 4	31 8	32 2	36 6	38 2
Newcastle - -	26 2	27 10	29 6	31 10	33 8	34 4
Shrewsbury - -	—	25 2	—	31 4	—	34 2
Aberdeen - -	23 0	24 2	31 6	33 2	34 10	36 2
Dundee - -	27 0	27 0	31 8	32 2	34 0	35 4
Edinburgh - -	—	—	31 10	32 6	35 8	35 10
Falkirk - -	27 0	—	31 2	—	34 6	—
Glasgow - -	31 2	29 2	32 2	32 2	33 10	35 2
Perth - -	30 2	30 4	32 8	32 10	34 10	35 8

Cattle, Sheep, and Swine, entering the Markets and Marts of the undermentioned Places, with the Number Weighed, as received from the Market Authorities in the **Fourth Quarter** of 1898, under the Markets and Fairs (Weighing of Cattle) Act, 1891 (54 & 55 Vict. c. 70).

PLACES.	Cattle.			Sheep.			Swine.		
	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.
ENGLAND.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Ashford - - -	3,373	9	—	28,596	—	—	6,850	—	—
Birmingham -	9,304	1	1	15,731	—	—	63,868	—	—
Bristol - - -	18,979	—	—	22,399	—	—	—	—	—
Carlisle - - -	22,173	1,907	1,907	83,417	—	—	5,720	—	—
Leicester - - -	17,446	385	299	27,655	25	25	2,188	2	2
Leeds - - -	8,859	447	447	25,820	—	—	2,299	108	108
Lincoln - - -	2,312	3	3	15,336	—	—	2,728	—	—
Liverpool - - -	27,337	4,000	3,963	85,444	397	397	—	—	—
London - - -	27,085	5,002	1,381	115,310	1,629	80	10	—	—
Newcastle-upon-Tyne	28,931	398	398	88,785	—	—	16,190	320	320
Norwich - - -	41,141	10	—	24,974	44	—	6,914	—	—
Salford - - -	39,387	476	—	111,362	—	—	851	—	—
Shrewsbury - -	12,133	2,493	2,377	22,209	130	—	7,736	3	3
Wakefield - -	23,736	609	235	59,430	—	—	1,844	—	—
York - - -	30,730	22	22	86,246	—	—	1,038	—	—
SCOTLAND.									
Aberdeen - - -	17,048	6,741	6,741	40,093	4,917	4,917	5,323	—	—
Dundee - - -	4,288	3,118	2,997	7,647	305	305	766	—	—
Edinburgh - - -	23,634	8,241	*4,502	61,119	—	—	2,324	—	—
Falkirk - - -	3,015	1,034	1,034	2,388	—	—	10	—	—
Glasgow - - -	24,763	3,987	3,827	125,163	106	—	1,789	—	—
Perth - - -	16,965	2,938	*805	90,511	1,676	1,676	2,133	55	55
TOTAL for ENGLAND	312,926	15,762	11,033	812,714	2,225	502	118,236	433	433
TOTAL for SCOTLAND	89,713	26,059	*19,906	326,921	7,004	6,898	12,345	55	55
Total - -	402,639	41,821	*30,939	1,139,635	9,229	7,400	130,581	488	488

* Prices for 3,717 cattle in addition to the above were quoted from Edinburgh, and for 2,133 cattle from Perth, but without distinguishing the quality.

Cattle, Sheep, and Swine entering the Markets and Marts of the undermentioned Places, with the Number Weighed, as received from the Market Authorities under the Markets and Fairs (Weighing of Cattle) Act, 1891 (54 and 55 Vict. c. 70) in the **Year 1898.**

PLACES.	Cattle.			Sheep.			Swine.		
	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.
ENGLAND.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Ashford - - -	12,653	193	—	113,293	30	—	17,500	—	—
Birmingham - -	32,141	19	19	89,188	—	—	164,588	—	—
Bristol - - -	59,701	145	120	115,890	—	—	—	—	—
Carlisle - - -	62,603	7,752	7,752	336,851	—	—	15,816	—	—
Leicester - - -	60,048	1,058	842	86,248	111	85	5,723	19	19
Leeds - - -	32,841	1,631	1,631	124,665	3,399	3,399	6,162	126	108
Lincoln - - -	8,129	36	32	64,147	—	—	10,371	9	9
Liverpool - - -	64,667	8,047	8,010	380,705	3,428	3,428	—	—	—
London - - -	78,105	14,324	4,930	540,140	7,176	112	1,550	—	—
Newcastle-upon-Tyne	97,800	2,303	2,303	344,328	8	8	39,881	1,035	1,035
Norwich - - -	113,309	269	2	206,950	44	—	26,069	—	—
Salford - - -	125,344	1,492	—	574,729	662	—	1,848	112	—
Shrewsbury - - -	43,816	6,224	5,805	80,384	138	—	17,489	21	21
Wakefield - - -	85,960	1,577	341	252,549	1,233	—	6,947	44	—
York - - -	89,080	31	30	188,356	—	—	3,918	—	—
SCOTLAND.									
Aberdeen - - -	56,966	23,116	23,116	199,408	22,921	22,921	19,387	—	—
Dundee - - -	17,587	13,383	13,103	30,153	3,257	3,235	2,106	—	—
Edinburgh - - -	75,048	28,905	*15,597	245,350	20	—	7,480	—	—
Falkirk - - -	11,230	3,633	3,633	8,558	—	—	69	—	—
Glasgow - - -	77,415	12,016	11,246	417,486	476	222	7,037	3	—
Perth - - -	59,548	12,498	*3,787	292,241	7,050	7,050	9,429	245	245
TOTAL for ENGLAND	966,197	45,101	31,817	3,498,423	16,229	7,032	317,862	1,366	1,192
TOTAL for SCOTLAND	297,794	93,551	*70,482	1,193,196	33,724	33,428	45,508	248	245
Total - -	1,263,991	138,652	*102,299	4,691,619	49,953	40,460	363,370	1,614	1,437

* Prices for 13,187 cattle in addition to the above were quoted from Edinburgh, and for 8,711 cattle from Perth, but without distinguishing the quality.

PRICES OF MEAT, CORN, AND DAIRY PRODUCE.

AVERAGE PRICES of DEAD MEAT, per Stone of 8 lbs., at the LONDON CENTRAL MEAT MARKET, during the Fourth Quarter of 1898, and during the Months of November and December, 1898, and January, 1899.

(Compiled from the prices quoted weekly in the "Meat Trades Journal.")

DESCRIPTION.	4TH QUARTER 1898.	NOVEMBER, 1898.	DECEMBER, 1898.	JANUARY, 1899.
	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
BEEF:—				
Scotch, short sides - - -	4 0 to 4 4	4 1 to 4 5	4 0 to 4 2	4 1 to 4 4
„ long sides - - -	3 8 „ 3 11	3 9 „ 3 11	3 8 „ 3 10	3 9 „ 4 0
English - - - - -	3 6 „ 3 8	3 7 „ 3 9	3 6 „ 3 9	3 8 „ 3 10
Cows and Bulls - - -	2 0 „ 2 9	2 1 „ 2 9	1 9 „ 2 9	1 11 „ 2 11
American, Birkenhead killed	3 2 „ 3 6	3 2 „ 3 6	3 2 „ 3 6	3 5 „ 3
„ Deptford killed -	3 2 „ 3 6	3 3 „ 3 6	3 2 „ 3 7	3 5 „ 3 8
Argentine „ „ - -	2 8 „ 3 0	2 8 „ 3 1	2 7 „ 2 11	2 11 „ 3 5
American Refrig. hind-qrs -	3 7 „ 3 10	3 8 „ 3 10	3 4 „ 3 8	3 7 „ 3 9
„ fore-qrs -	2 3 „ 2 6	2 5 „ 2 7	2 2 „ 2 4	2 5 „ 2 7
Australian, Frozen hind-qrs -	2 0 „ 2 2	2 0 „ 2 2	1 10 „ 2 1	1 9 „ 1 11
„ „ fore-qrs -	1 9 „ 1 10	1 10 „ 1 11	1 9 „ 1 11	1 8 „ 1 9
New Zealand „ hind-qrs -	2 3 „ 2 6	2 3 „ 2 6	2 2 „ 2 5	2 1 „ 2 3
„ „ fore-qrs -	1 10 „ 2 0	1 11 „ 2 1	1 11 „ 2 1	1 8 „ 1 10
MUTTON:—				
Scotch, Prime - - - -	4 1 „ 4 7	4 3 „ 4 8	4 1 „ 4 6	4 0 „ 4 6
English, Prime - - - -	3 9 „ 4 4	3 10 „ 4 5	3 8 „ 4 4	3 10 „ 4 4
Ewes - - - - -	2 9 „ 3 1	2 10 „ 3 3	2 9 „ 3 1	2 8 „ 3 2
Continental - - - -	3 1 „ 3 6	3 3 „ 3 7	3 0 „ 3 6	3 2 „ 3 6
River Plate, Town killed -	2 11 „ 3 2	3 2 „ 3 4	2 10 „ 3 0	2 11 „ 3 2
New Zealand, Frozen - -	1 11 „ 2 5	2 0 „ 2 4	2 0 „ 2 6	2 0 „ 2 8
Australian, Frozen - - -	1 9 „ 1 10	1 9 „ 1 10	1 9 „ 1 11	1 10 „ 1 11
River Plate, Frozen - - -	1 10 „ 1 11	1 10 „ 1 11	1 9 „ 1 11	1 10 „ 2 0
LAMB:—				
English - - - - -	4 2 „ 4 8	— —	— —	— —
New Zealand, Frozen - -	3 0 „ 3 6	3 2 „ 3 7	2 8 „ 3 6	3 0 „ 3 5
VEAL:—				
English - - - - -	4 3 „ 4 7	4 2 „ 4 8	4 4 „ 4 8	4 4 „ 4 10
Foreign - - - - -	3 7 „ 4 1	3 7 4 0	3 10 „ 4 2	3 10 „ 4 2
PORK:—				
English, best - - - - -	3 11 „ 4 3	3 11 „ 4 3	3 8 „ 4 1	3 7 „ 3 11
„ secondary - - - - -	3 5 „ 3 10	3 5 „ 3 10	3 2 „ 3 7	3 1 „ 3 6
Foreign - - - - -				

AVERAGE WHOLESALE PRICES of CATTLE and SHEEP, per Stone of 8 lbs., sinking the offal, at the METROPOLITAN CATTLE MARKET, during each Quarter of 1898, with the Mean Prices for the Year.

PERIOD.	CATTLE.			SHEEP.		
	Inferior.	Second.	First.	Inferior.	Second.	First.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
1st Quarter, 1898	2 4	3 9	4 4	3 4	5 1	5 9
2nd Quarter „	2 4	3 7	4 2	2 10	4 5	5 2
3rd Quarter „	2 4	3 8	4 3	3 1	4 8	5 5
4th Quarter „	2 5	3 9	4 5	3 3	4 10	5 7
The Year „	2 4	3 8	4 3	3 2	4 9	5 6

AVERAGE WHOLESALE PRICES OF BEEF and MUTTON, per Stone of 8 lbs., by the Carcase, at LIVERPOOL and GLASGOW, during each Quarter of 1898, with the Mean Prices for the Year.

PERIOD.	LIVERPOOL.*				GLASGOW.†			
	BEEF.		MUTTON.		BEEF.		MUTTON.	
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
1st Quarter, 1898	2 0 to 3 6	3 4 to 4 8	2 4 to 3 8	3 0 to 4 8	2 4 to 3 8	3 0 to 4 8	2 4 to 3 8	3 0 to 4 8
2nd Quarter „	2 4 „ 3 2	3 8 „ 4 10	2 8 „ 3 6	3 4 „ 4 8	2 8 „ 3 6	3 4 „ 4 8	2 8 „ 3 6	3 4 „ 4 8
3rd Quarter „	2 4 „ 3 6	3 2 „ 4 8	2 4 „ 3 6	3 4 „ 4 6	2 4 „ 3 6	3 4 „ 4 6	2 4 „ 3 6	3 4 „ 4 6
4th Quarter „	2 4 „ 3 8	3 4 „ 4 8	2 8 „ 3 10	3 0 „ 4 6	2 8 „ 3 10	3 0 „ 4 6	2 8 „ 3 10	3 0 „ 4 6
The Year „	2 3 „ 3 5	3 4 „ 4 8	2 6 „ 3 7	3 2 „ 4 7	2 6 „ 3 7	3 2 „ 4 7	2 6 „ 3 7	3 2 „ 4 7

* Compiled from information furnished by the Medical Officer of Health, Liverpool. The prices quoted are for Carcases of Animals *slaughtered at the Liverpool Abattoir*, and do not apply to Imported Meat.

† Compiled from information furnished by the Principal of the Veterinary College, Glasgow.

BERLIN MARKET.

AVERAGE PRICES of CATTLE and SHEEP (First Quality Dead Weight) in the BERLIN CATTLE MARKET in the under-mentioned Months of 1898 and 1899, together with the Mean Prices for 1898.

MONTHS.	CATTLE.		SHEEP.	
	Per Cwt.		Per Cwt.	
December, 1898 - - -	s. d. 61 4	to s. d. 65 11	s. d. 61 7	to s. d. 63 8
Mean of the Year - - -	60 10	„ 65 2	58 10	„ 61 5
January, 1899 - - -	60 10	„ 65 5	60 1	„ 62 1
February - - - -	60 7	„ 64 5	58 0	„ 60 1

NOTE.—The above prices have been compiled from the weekly returns published in the *Deutsche Landwirthschaftliche Presse*.

PARIS MARKET.

AVERAGE PRICES of CATTLE, SHEEP, and SWINE (Medium Quality) in the PARIS CATTLE MARKET in the under-mentioned Months of 1898 and 1899, together with the Mean Prices for the Year 1898.

MONTHS.	OXEN.	CALVES.	SHEEP.	PIGS.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
LIVE WEIGHT.				
December, 1898 - - -	s. d. 29 6	s. d. 41 10	s. d. 34 10	s. d. 41 1
Mean of the Year - - -	29 11	40 2	35 6	39 10
January, 1899 - - -	30 5	44 2	34 6	41 7
February - - - -	30 7	45 7	34 10	44 0
DEAD WEIGHT.				
December, 1898 - - -	s. d. 49 2	s. d. 70 1	s. d. 69 5	s. d. 58 6
Mean of the Year - - -	50 5	69 9	68 8	56 10
January, 1899 - - -	51 1	65 8	69 3	58 5
February - - - -	51 4	77 5	69 6	62 7

NOTE.—The above prices have been compiled from the weekly returns published in the *Journal d'Agriculture Pratique*.

CHICAGO.

PRICES of CATTLE at CHICAGO per Cwt. (Live Weight) in the under-mentioned Months of 1898 and 1899, together with the Mean Prices for the Year 1898.

Months.	Good Dressed Beef and Shipping Steers.				Export Cattle.				Extra Prime Cattle.			
	s.	d.			s.	d.			s.	d.		
December, 1898	21	11	to	25	8	22	2	to	26	2	26	2
Mean of the year - -	21	0	„	24	9	20	9	„	25	4	24	10
January, 1899 -	23	4	„	27	6	23	10	„	27	4	27	6
February - -	22	2	„	26	2	22	5	„	27	4	27	2

Compiled from the Live Stock Reports issued by Messrs. Clay, Robinson, and Co., of the Union Stock Yards, Chicago, Illinois.

AVERAGE VALUES, per Cwt., of various Kinds of DEAD MEAT Imported into the United Kingdom from FOREIGN COUNTRIES and BRITISH POSSESSIONS in each Quarter of 1898, with the Average Values for the Year.

(Computed from the Trade and Navigation Accounts.)

PERIOD.	BEEF.		MUTTON.	PORK.		BACON.	HAMS.
	Fresh.	Salted.		Fresh.	Salted.		
1st Quarter, 1898 -	s. d. 40 8	s. d. 25 11	s. d. 28 10	s. d. 42 11	s. d. 25 10	s. d. 34 6	s. d. 39 9
2nd Quarter „ -	39 3	26 9	29 8	41 10	22 9	36 5	39 2
3rd Quarter „ -	37 8	26 1	30 0	41 9	20 5	37 1	39 1
4th Quarter „ -	35 3	25 10	29 8	41 1	23 7	36 8	40 2
The Year „ -	38 2	26 2	29 7	41 10	23 2	36 2	39 6

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels,* computed from the Weekly Averages of Corn Returns from the 196 Returning Markets of ENGLAND AND WALES, pursuant to the Corn Returns Act, 1882, together with the QUANTITIES returned as sold at such Markets, in the under-noted periods of the Years 1898, 1897, and 1896.

QUARTER ENDED	PRICES.			QUANTITIES.		
	1898.	1897.	1896.	1898.	1897.	1896.
Wheat.						
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
Lady Day - - -	35 1	29 7	25 8	699,657	619,679	448,047
Midsummer - - -	41 5	27 6	25 2	557,504	619,618	384,559
Michaelmas - - -	32 8	30 4	23 7	308,279	635,698	595,988
Christmas - - -	27 2	33 3	30 5	1,036,975	881,566	772,427
Barley.						
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
Lady Day - - -	27 9	24 0	22 5	902,452	784,713	955,902
Midsummer - - -	26 10	21 4	21 4	47,621	78,488	92,739
Michaelmas - - -	25 10	21 6	21 0	99,743	118,875	165,722
Christmas - - -	28 2	27 0	27 1	2,603,841	2,275,111	2,177,499
Oats.						
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
Lady Day - - -	17 5	16 4	13 9	226,150	194,193	259,565
Midsummer - - -	19 10	17 3	14 3	93,475	79,707	99,672
Michaelmas - - -	19 7	17 10	14 6	78,787	75,824	94,383
Christmas - - -	16 11	16 5	16 7	289,652	200,710	201,533

* Section 8 of the Corn Returns Act, 1882, provides that where returns of purchases of British Corn are made to the local inspector of Corn Returns in any other measure than the imperial bushel or by weight or by a weighed measure that officer shall convert such returns into the imperial bushel, and in the case of weight or weighed measure the conversion is to be made at the rate of 60 imperial pounds for every bushel of wheat, 50 imperial pounds for every bushel of barley, and 39 imperial pounds for every bushel of oats.

CORN PRICES :—ANNUAL AVERAGES.

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Weekly Averages of Corn Returns from the 196 Returning Markets, together with the QUANTITIES returned as sold at such Markets during each of the years 1894 to 1898.

YEARS.	PRICES.			QUANTITIES.		
	Wheat.	Barley.	Oats.	Wheat.	Barley.	Oats.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
1894 - - -	22 10	24 6	17 1	1,956,824	2,729,348	565,747
1895 - - -	23 1	21 11	14 6	1,928,383	3,426,576	665,939
1896 - - -	26 2	22 11	14 9	2,111,021	3,391,862	655,153
1897 - - -	30 2	23 6	16 11	2,756,561	3,257,187	550,434
1898 - - -	34 0	27 2	18 5	2,602,416	3,653,657	688,064

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Returns received under the Corn Returns Act, 1882, in each of the under-mentioned Weeks in 1899, and in the corresponding Weeks in 1898 and 1897.

Weeks ended (<i>in 1899</i>).	Wheat.			Barley.			Oats.		
	1899.	1898.	1897.	1899.	1898.	1897.	1899.	1898.	1897.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Jan. 7 -	27 0	34 11	31 1	28 3	27 9	25 5	17 0	16 10	16 3
„ 14 -	27 2	35 0	31 8	28 2	27 8	24 10	17 1	17 4	16 5
„ 21 -	27 0	34 11	31 7	27 11	27 10	25 5	17 1	17 5	16 6
„ 28 -	26 7	34 6	31 3	27 9	27 8	24 7	17 0	17 2	16 8
Feb. 4 -	26 6	34 10	30 7	27 2	28 0	24 10	17 0	17 6	16 7
„ 11 -	26 8	35 1	29 8	27 2	27 8	24 8	17 0	17 5	16 6
„ 18 -	26 0	35 0	28 11	26 10	27 11	23 9	16 11	17 8	16 5
„ 25 -	25 7	35 5	28 2	26 7	27 6	23 8	16 11	17 10	16 3
Mar. 4 -	25 8	35 10	28 3	26 7	28 0	23 0	17 0	17 11	16 3
„ 11 -	25 10	35 8	27 11	26 7	27 10	22 11	16 11	17 9	16 2
„ 18 -	25 10	35 6	27 11	26 3	28 0	22 8	16 10	17 10	16 2
„ 25 -		35 4	27 9		28 6	22 5		17 8	16 3
Apl. 1 -		35 3	27 10		27 11	22 3		17 10	16 3
„ 8 -		35 2	27 8		27 0	22 7		17 11	16 6
„ 15 -		35 3	27 0		28 0	23 0		18 2	16 3
„ 22 -		36 1	26 6		28 3	20 7		18 4	16 7
„ 29 -		38 4	27 9		27 10	20 5		18 11	17 3
May 6 -		42 4	28 4		27 8	21 5		20 4	16 11
„ 13 -		45 11	27 11		27 1	20 2		21 1	17 7
„ 20 -		48 1	28 1		26 0	19 10		21 3	17 9
„ 27 -		47 9	28 2		26 5	21 3		21 5	17 10
June 3 -		46 3	27 10		26 10	20 8		21 0	17 9
„ 10 -		45 4	27 4		25 8	22 8		20 11	17 11
„ 17 -		42 4	27 0		26 1	23 9		20 5	18 0
„ 24 -		40 8	27 0		24 3	19 9		20 7	18 6
July 1 -		38 3	27 1		23 4	18 10		20 8	18 7
„ 8 -		36 10	27 4		25 0	17 4		20 5	18 8
„ 15 -		37 1	27 7		24 1	17 6		20 10	18 3
„ 22 -		38 1	28 1		25 0	18 10		20 10	18 11
„ 29 -		36 11	28 10		24 2	17 10		20 11	19 0
Aug. 5 -		35 7	29 5		26 11	17 9		20 7	18 11
„ 12 -		33 8	29 8		27 5	19 0		20 9	17 4
„ 19 -		32 7	30 4		24 4	19 2		19 11	17 2
„ 26 -		30 7	31 8		27 6	22 5		19 3	17 1
Sept. 2 -		28 1	33 7		27 8	25 11		18 11	17 0
„ 9 -		26 10	33 1		27 9	27 4		17 10	17 3
„ 16 -		25 7	33 10		26 10	28 11		16 10	17 0
„ 23 -		25 5	33 11		26 9	29 7		17 1	16 8
„ 30 -		25 9	33 4		27 0	29 10		16 7	16 4
Oct. 7 -		26 6	32 1		27 5	28 9		16 7	16 0
„ 14 -		26 6	31 10		27 11	28 3		16 6	16 1
„ 21 -		26 8	32 2		28 1	27 5		16 6	16 2
„ 28 -		27 4	32 10		28 8	27 5		16 8	16 0
Nov. 4 -		28 4	33 5		28 6	26 10		17 2	16 5
„ 11 -		28 4	34 0		28 7	26 3		17 5	16 3
„ 18 -		28 1	33 11		28 5	26 2		17 2	16 5
„ 25 -		27 9	33 8		28 4	25 9		17 1	16 8
Dec. 2 -		27 7	33 9		28 6	25 10		17 1	16 9
„ 9 -		27 6	33 9		28 6	26 0		17 3	16 6
„ 16 -		27 2	34 1		28 5	26 4		17 0	17 0
„ 23 -		26 9	34 4		28 6	26 11		17 0	17 0
„ 30 -		26 11	34 6		28 4	27 3		17 0	17 1

AVERAGE VALUE per IMPERIAL QUARTER of WHEAT IMPORTED into the UNITED KINGDOM from the under-mentioned Foreign Countries and British Possessions in the Years 1896, 1897, and 1898.

COUNTRIES from which Exported.	Average Value per Imperial Quarter.		
	1896.	1897.	1898.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
ARGENTINE REPUBLIC - - -	25 1	29 3	37 6
CHILE - - - - -	26 4	31 5	35 1
ROUMANIA - - - - -	26 11	29 9	35 9
RUSSIA - - - - -	25 9	31 0	34 11
TURKEY- - - - -	26 10	30 1	31 3
U.S. OF AMERICA { Atlantic - -	27 2	33 0	34 7
Pacific - -	27 0	31 0	34 11
INDIA, BRITISH - - - -	25 4	36 2	31 11
NORTH AMERICA, BRITISH - -	25 11	33 4	33 4
GERMANY - - - - -	29 2	30 10	36 5

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in FRANCE, and ENGLAND and WALES in the under-mentioned Months of 1898 and 1899.

MONTH.	FRANCE.	ENGLAND.
WHEAT.		
	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>
December, 1898 - - - -	37 2	27 2
January, 1899 - - - -	37 1	26 11
February - - - - -	37 3	26 2
BARLEY.		
	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>
December, 1898 - - - -	22 9	28 5
January, 1899 - - - -	22 10	28 0
February - - - - -	23 1	26 11
OATS.		
	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>
December, 1898 - - - -	18 6	17 0
January, 1899 - - - -	18 7	17 0
February - - - - -	18 8	16 11

Note.—The prices of French grain have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*. The prices of British grain are official averages based on the weekly returns furnished under the Corn Returns Act, 1882.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in BELGIUM in the under-mentioned Months of 1898.

Month.	Wheat.	Barley.	Oats.
1898.	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
November - - - -	29 10	23 8	17 11
December - - - -	29 2	23 7	17 10
Mean of the year - - -	35 10	22 11	19 2

The above prices have been compiled from the official monthly averages published in the *Moniteur Belge*.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER at the under-mentioned Markets in the under-mentioned Months of 1898 and 1899.

Month.	London.	Paris.	Breslau.
WHEAT.			
	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d. s. d.</i>
December, 1898 - -	28 10	36 6	32 9 to 36 5
Mean of the year 1898 - -	34 9	45 3	36 0 „ 41 0
January, 1899 - -	28 0	36 10	32 8 „ 36 5
February - - - -	27 0	37 4	32 4 „ 36 1
BARLEY.			
	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d. s. d.</i>
December, 1898 - -	28 7	21 2	24 9 to 28 4
Mean of the year 1898 - -	27 5	23 8	24 10 „ 28 8
January, 1899 - -	31 6	22 1	24 9 „ 28 4
February - - - -	28 7	22 1	24 3 „ 27 11
OATS.			
	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d. s. d.</i>
December, 1898 - -	18 0	17 8	17 0 to 18 0
Mean of the year 1898 - -	19 4	20 10	19 8 „ 21 1
January, 1899 - -	18 1	18 5	17 5 „ 18 5
February - - - -	17 10	18 11	17 5 „ 18 5

Note.—The London quotation represents the price of British corn as returned under the Corn Returns Act, 1882; the price of grain in Paris is the official average price of French wheat in that city; the quotations shown for Breslau represent the prices of grain of good merchantable quality.

MEAN WHOLESALE PRICES of BUTTER, MARGARINE, and
CHEESE in the under-mentioned Months of 1898 and 1899.
(Compiled from the Grocer.)

DESCRIPTION.	December, 1898.		January, 1899.		February, 1899.	
	Per Cwt.		Per Cwt.		Per Cwt.	
BUTTER :	s.	d.	s.	d.	s.	d.
Cork, 1sts - -	102	0	108	0	114	0
„ 2nds - -	93	6	100	6	108	0
„ 3rds - -	82	6	88	6	93	6
„ 4ths - -	67	0	69	6	68	6
Friesland - -	106	0 to 108	103	0 to 106	106	0 to 110
Dutch Factories - -	109	0,, 112	105	0,, 108	107	0,, 111
French Baskets - -	110	0,, 120	107	6,, 117	100	0,, 110
Crocks and Firkins - -	100	0,, 114	98	0,, 110	92	0,, 98
„ 2nds and 3rds	94	0,, 98	91	6,, 96	86	0,, 90
Danish and Swedish -	118	6,, 122	108	0,, 112	109	6,, 113
Finnish - -	92	6,, 111	82	6,, 102	84	0,, 104
Russian - -	81	6,, 103	76	6,, 96	80	0,, 98
Canadian and States -	75	0,, 104	65	6,, 97	72	0,, 98
Argentine - -	99	6 114	97	0,, 109	98	0,, 107
Colonial, fine- -	106	6 111	98	0,, 104	97	0,, 103
„ good and inferior -	93	0,, 102	76	6,, 93	73	0,, 93
Fresh Rolls (Foreign) per doz. - -	10	6,, 15	10	6,, 15	10	6,, 15
MARGARINE :						
Margarine - -	29	6,, 60	30	0,, 60	30	0,, 60
Mixtures - -	51	6,, 80	52	0,, 80	57	6,, 81
CHEESE :						
Cheddar - -	46	0,, 72	46	0,, 72	45	0,, 72
Somerset - -	48	0,, 64	49	6,, 64	50	0,, 64
Cheshire - -	70	0,, 80	70	0,, 80	73	6,, 80
Wiltshire - -	56	0,, 64	51	6,, 64	53	0,, 65
Double Gloucester -	40	6,, 53	37	0,, 53	39	0,, 55
Derby - -	39	0,, 49	42	6,, 50	45	6,, 57

WEEKLY PRICES (WHOLESALE) of VEGETABLES and FRUIT
at COVENT GARDEN MARKET in February, 1899.

(Compiled from the Gardeners' Chronicle.)

	Week ending							
	2nd Feb.		9th Feb.		16th Feb.		23rd Feb.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
VEGETABLES—								
Artichokes, Globe, per dozen	2 6	to 3 0	2 6	to 3 0	2 6	to 3 0	2 6	to 3 0
Asparagus, English, per 100	5 0	„ 7 0	7 0	„ 8 0	7 0	„ 8 0	7 0	„ 8 0
Beans, Dwarf, Channel Islands, per lb.	2 0	„ 2 6	2 0	—	2 0	—	2 6	—
Beetroots, per dozen	0 6	„ 0 9	0 6	„ 0 9	0 6	„ 0 9	0 6	„ 0 9
Broccoli Sprouts, per bushel	2 0	„ 2 6	2 0	„ 2 6	3 0	—	3 0	—
Brussels Sprouts, per sieve	1 6	„ 2 6	1 6	„ 2 6	2 3	„ 3 0	1 6	„ 2 6
Brussels Tops, per bushel	1 6	—	1 6	„ 2 0	2 6	—	2 6	—
Cabbage, Coleworts, per bushel	2 0	„ 2 6	2 0	„ 2 6	3 0	—	3 0	—
Cabbage, Savoys, per dozen	1 3	„ 2 0	1 0	„ 2 0	1 0	„ 2 0	1 0	„ 2 0
Carrots, washed, in bags	3 0	—	3 0	—	3 0	—	3 0	—
Carrots, Surrey, bunches	2 0	„ 2 6	2 0	„ 2 6	2 0	„ 2 6	2 0	„ 2 6
Cauliflowers, per dozen	1 0	„ 1 2	1 9	„ 2 6	1 9	„ 2 6	1 6	„ 2 0
Celery, Red, per dozen bundles	8 0	„ 12 0	8 0	„ 12 0	8 0	„ 12 0	8 0	„ 12 0
Cress, per dozen punnets	1 6	—	1 6	—	1 6	—	1 6	—
Cucumbers, per dozen	5 0	„ 10 0	6 0	„ 8 0	6 0	„ 8 0	6 0	„ 9 0
Horseradish, New English, per bundle	2 0	„ 2 6	2 0	„ 2 6	2 0	„ 2 6	2 0	„ 2 6
Lettuce Cabbage, per dozen	0 10	„ 1 0	0 10	„ 1 0	1 6	—	0 10	„ 1 3
Mushrooms, House, per lb.	0 7	„ 0 9	0 8	„ 1 0	0 8	„ 1 0	0 8	„ 1 0
Onions, English, per cwt.	6 0	„ 6 6	6 6	„ 7 0	6 6	„ 7 0	6 6	„ 7 0
Parsley, per dozen	1 0	„ 1 6	1 0	„ 1 6	2 0	—	2 0	—
Parsnips, per dozen	0 6	„ 0 9	0 6	„ 0 9	0 6	„ 0 9	0 6	„ 0 9
Potatoes, Hebrons, Snowdrops, Up-to-Date, Beauties, Saxons, etc., per ton	60 0	„ 80 0	60 0	„ 80 0	60 0	„ 80 0	55 0	„ 75 0
Potatoes, Dunbar Main Crop, per ton	90 0	—	90 0	—	90 0	—	90 0	—
Potatoes, New Teneriffe, per cwt.	12 0	„ 18 0	11 0	„ 14 0	11 0	„ 14 0	11 0	„ 14 0
Radishes, Round, per dozen bunches	1 3	„ 1 6	1 3	„ 1	1 9	—	1 9	—
Rhubarb, York, per dozen bundles	1 3	„ 1 6	1 6	—	1 0	„ 1 6	1 0	„ 1 6
Salad, Small, per dozen punnets	1 3	—	1 3	—	1 3	—	1 3	—
Shallots, per cwt.	8 0	„ 9 0	8 0	„ 9 0	8 0	„ 9 0	8 0	„ 9 0
Tomatoes, New English, per lb.	1 0	—	1 0	„ 1 3	1 0	„ 1 3	1 0	„ 1 3
Turnips, English, per dozen bunches	2 0	—	2 0	„ 2 6	3 0	—	3 0	—
Turnip Tops, per bag	2 0	„ 2 6	2 6	„ 3 0	5 0	—	5 0	—
Watercress, per dozen bunches	0 6	„ 0 10	0 6	„ 0 10	0 6	„ 0 10	0 6	„ 0 10
FRUIT—								
Apples, Beefings, etc., per bushel	4 0	„ 5 6	4 0	„ 6 0	4 0	„ 6 0	4 0	„ 6 0
Apples, Wellingtons, per bushel	6 0	„ 9 0	6 0	„ 9 0	6 0	„ 9 0	6 0	„ 9 0
Apples, Nova Scotia, various, per barrel	16 0	„ 25 0	14 0	„ 25 0	14 0	„ 25 0	14 0	„ 20 0
Apples, large Cookers, cases	7 0	—	7 6	—	7 6	—	7 6	—
Cobnuts, per 100 lbs.	30 0	„ 40 0	30 0	„ 40 0	30 0	„ 40 0	30 0	„ 35 0
Grapes, English Alicante, per lb.	1 0	„ 1 6	1 3	„ 1 9	1 6	„ 2 0	1 6	„ 2 0
Grapes, Gros Colmar, per lb.	1 3	„ 1 9	1 6	„ 2 3	1 6	„ 2 3	1 6	„ 2 3
Nectarines, Cape, case 28	—	—	13 0	„ 28 0	13 0	—	13 0	—
Peaches, Cape, case 24	8 0	„ 14 0	10 0	„ 14 0	10 0	„ 14 0	8 0	„ 10 0
Pears, Californian, Easter Beurré, case 108	18 0	—	18 0	—	18 0	—	18 0	—
Pines, St. Michael's, each	3 6	„ 8 0	3 0	„ 6 0	3 0	„ 6 0	3 0	„ 6 0
Plums, Cape, case 30	10 0	„ 11 0	10 0	„ 12 0	10 0	„ 12 0	—	—

DISEASES OF ANIMALS IN GREAT BRITAIN.
 NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Board of Agriculture, in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUTBREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUTBREAKS Confirmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
September, 1897 -	1	4	71	392	8,026
December, 1897 -	1	3	23	278	5,731
March, 1898 -	1	1	220	578	11,466
June, 1898 -	—	—	—	879	15,352
September, 1898 -	—	—	—	550	8,017
December, 1898 -	—	—	—	507	8,921

NUMBER of OUTBREAKS reported as having taken place, and
 Number of ANIMALS returned as having been ATTACKED
 by **Anthrax** and **Glanders** in GREAT BRITAIN in each
 of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).	
	OUTBREAKS Reported.	ANIMALS Attacked.	OUTBREAKS Reported.	ANIMALS Attacked.
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
September, 1897 -	93	171	249	437
December, 1897 -	102	204	225	458
March, 1898 -	156	245	197	381
June, 1898 -	169	254	195	337
September, 1898 -	92	134	188	361
December, 1898 -	139	223	168	306

NUMBER OF CASES of **Rabies** in DOGS in GREAT BRITAIN
 during each of the under-mentioned periods.

THREE MONTHS ENDED					Number of Cases.
30th September, 1897	-	-	-	-	40
31st December, 1897	-	-	-	-	21
31st March, 1898	-	-	-	-	8
30th June, 1898	-	-	-	-	6
30th September, 1898	-	-	-	-	1
31st December, 1898	-	-	-	-	2

DISEASES OF ANIMALS IN IRELAND.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Lord Lieutenant and Privy Council in IRELAND, in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUT- BREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUT- BREAKS Con- firmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	No.	No.	No.	No.
September, 1897 -	—	—	—	120	749
December, 1897 -	—	—	—	38	655
March, 1898 -	—	—	—	81	1,039
June, 1898 -	—	—	—	97	1,225
September, 1898 -	—	—	—	105	1,269
December, 1898 -	—	—	—	42	496

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax**, **Glanders**, and **Rabies** in Ireland in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).		Rabies.	
	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	CASES REPORTED.	
					DOGS.	OTHER ANIMALS.
	No.	No.	No.	No.	No.	No.
Sept., 1897 -	—	—	1	1	110	29
Dec., 1897 -	—	—	—	—	26	16
March, 1898 -	1	8	—	—	13	2
June, 1898 -	—	—	1	1	28	11
Sept., 1898 -	1	3	2	4	31	12
Dec., 1898 -	—	—	3	3	3	5

PRICES OF WOOL.

PRICES OF ENGLISH WOOL, per pack of 240 lbs., in the under-mentioned Months of 1898 and 1899.

(Compiled from the Economist.)

DESCRIPTION.	December, 1898.				January, 1899.				February, 1899.						
South Down - -	£	s.	to	£	s.	to	£	s.	to	£	s.	to	£	s.	
	8	0		10	0		8	0		10	0		8	5	
Half breds - -	7	0	„	8	0	7	0	„	8	1	7	0	„	8	5
Leicester - -	7	0	„	8	0	7	0	„	8	1	7	0	„	8	5
Kent Fleeces - -	7	0	„	8	0	7	0	„	8	1	7	0	„	8	5

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INVESTMENTS IN GOVERNMENT STOCK can be made through any Post Office Savings Bank of sums from one shilling to £200 Stock in any year ending 31st December until the maximum of £500 Stock has been reached; and money can be deposited for this purpose irrespective of ordinary Savings Bank deposits. The dividends are collected by the Post Office and added to the depositors' accounts without charge.

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FURTHER PROVISIONS IN REGARD TO STOCK.—A depositor may, at a small cost, transfer Stock into his name at the Bank of England, or obtain a Stock Certificate with dividend coupons annexed.

LIST OF LEAFLETS ISSUED BY THE BOARD OF AGRICULTURE.

Number.	Title.
Leaflet No. 1	Mites on Currant and Nut Trees.
" " 2	Vine and Raspberry Weevils.
" " 3	The Turnip Fly or Flea.
" " 4	Caterpillars on Fruit Trees.
" " 5	The Margel Wurzel Fly.
" " 6	The Field Vole.
" " 8	Farmers and Assessments to Local Rates.
" " 9	Ensilage.
" " 10	Wireworms.
" " 11	The Daddy Longlegs.
" " 12	The Gooseberry Saw-Fly.
" " 13	Acorn Poisoning.
" " 14	The Raspberry Moth.
" " 15	The Apple Blossom Weevil.
" " 16	The Apple Sucker.
" " 18	Fertilisers and Feeding Stuffs Act.
" " 19	Pea and Bean Weevil.
" " 20	The Magpie Moth.
" " 21	The Warble Fly.
" " 22	The Diamond Back Moth.
" " 23	Potato Disease.
" " 24	The Ribbon Footed Corn-Fly.
" " 25	The Cockchafer.
" " 26	Farmers and the Income Tax.
" " 27	Remission of Tithe Rentcharge.
" " 28	Anthrax.
" " 29	Swine Fever.
" " 30	The Codlin Moth.
" " 31	The Onion Fly.
" " 32	Foul Brood or Bee Pest.
" " 33	Surface Caterpillars.
" " 34	The Woolly Aphis or American Blight.
" " 35	The Celery Fly.
" " 36	Cultivation of Osiers.
" " 37	Rabies.
" " 38	The Carrot Fly.
" " 39	Assessments to Land Tax.
" " 40	The Kestrel or Windhover.
" " 41	The Red Spider or Spinning Mite.
" " 42	The Short-eared Owl.
" " 43	Titmice.
" " 44	The Common Lapwing, Plover or Peewit.
" " 45	The Starling.
" " 46	The Stem Eelworm.
" " 47	The Asparagus Beetle.
" " 48	The Pea Thrips.
" " 49	The Fruit Tree Beetle.
" " 50	Water Wagtails or "Dishwashers."
" " 51	The White or Barn Owl.
" " 52	Gooseberry Blight.
" " 53	The Pear Midge.
" " 54	The Spotted Flycatcher.
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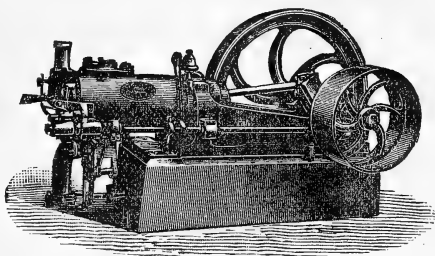
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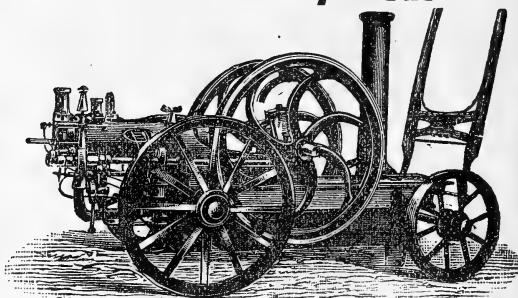
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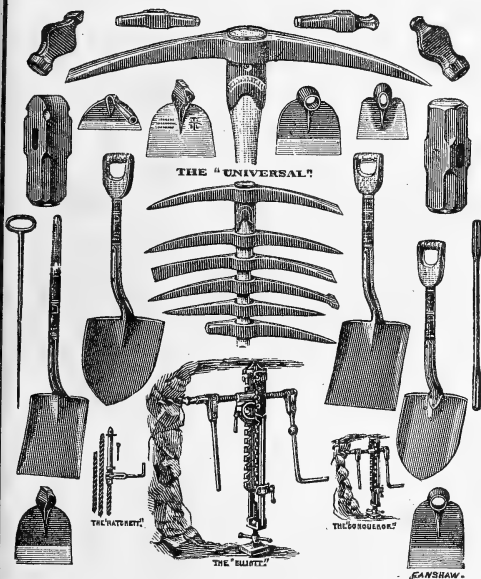
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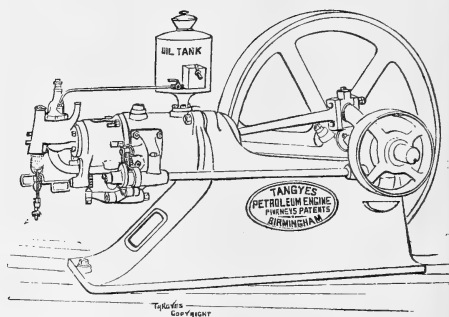
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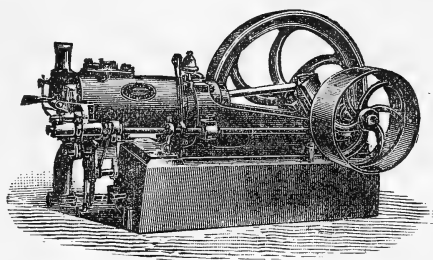
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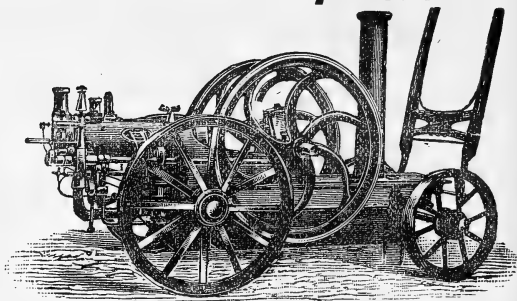
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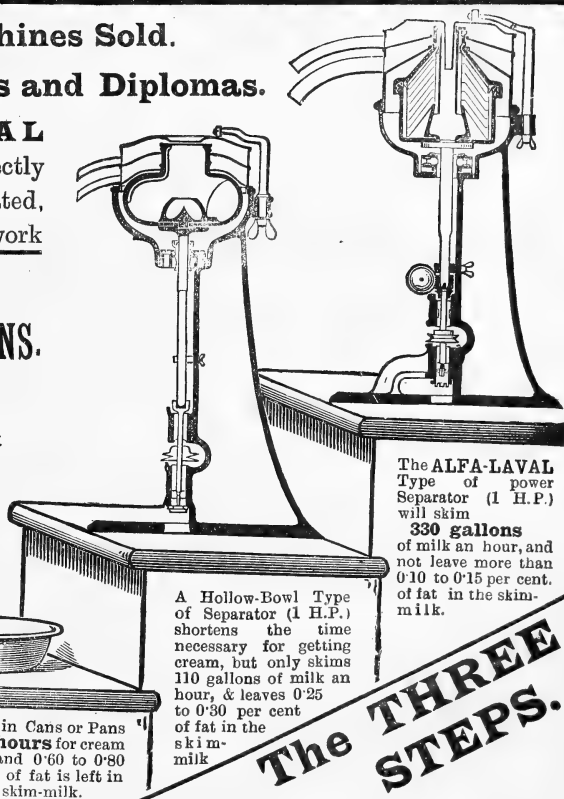
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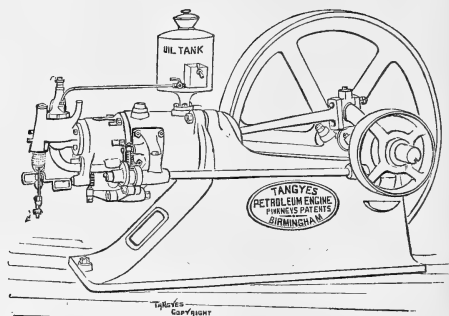
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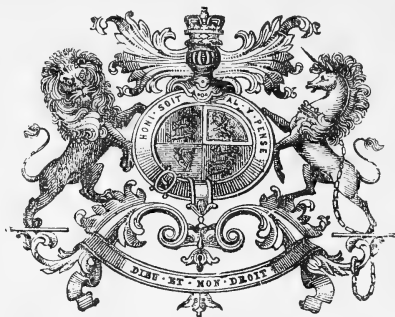
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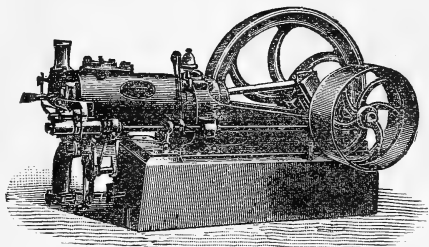
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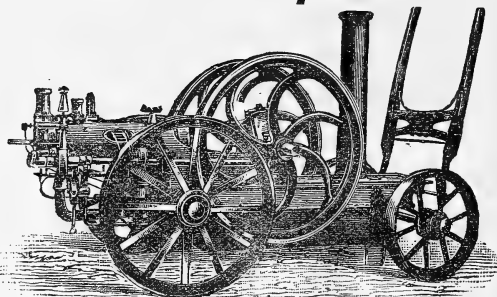
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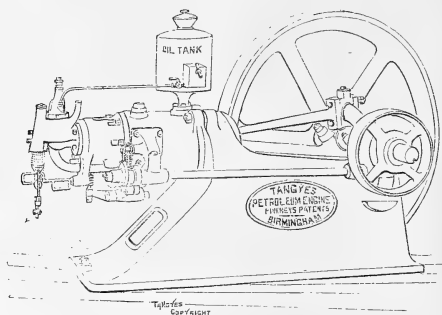
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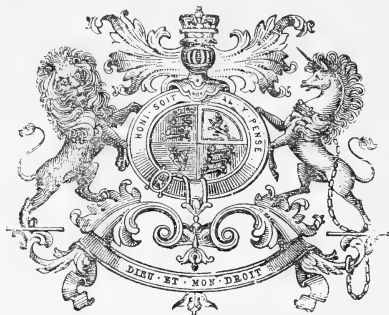
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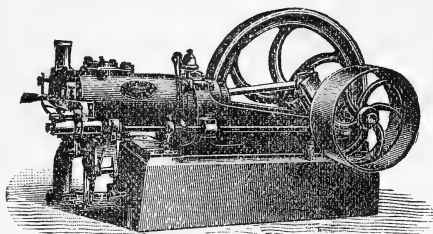
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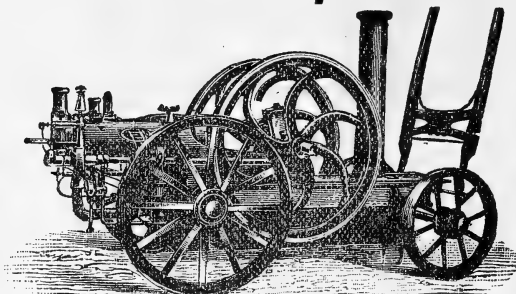
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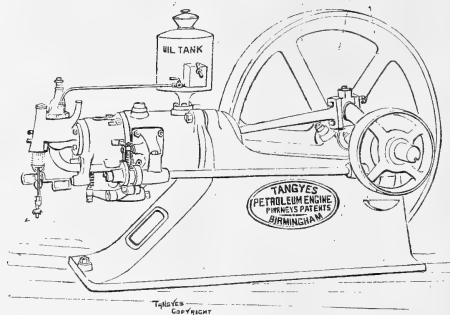
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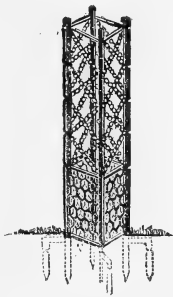
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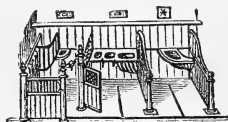
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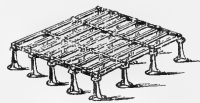
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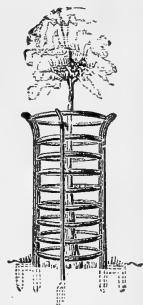


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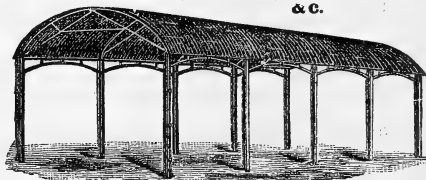


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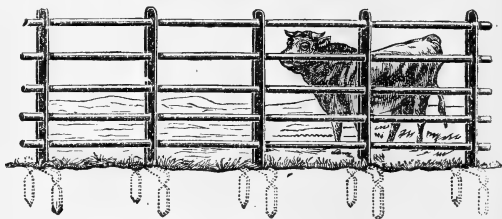
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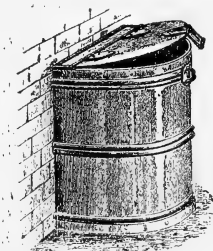
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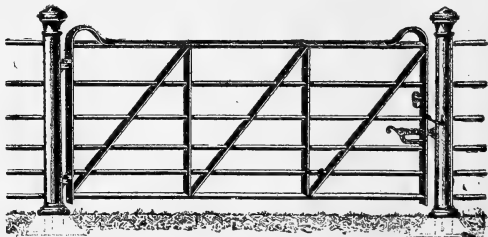
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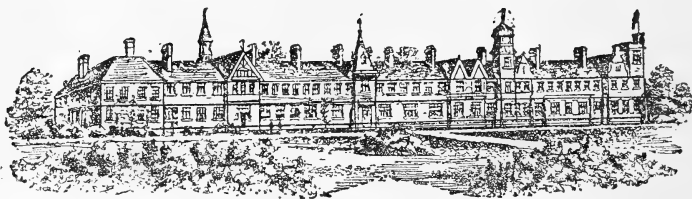
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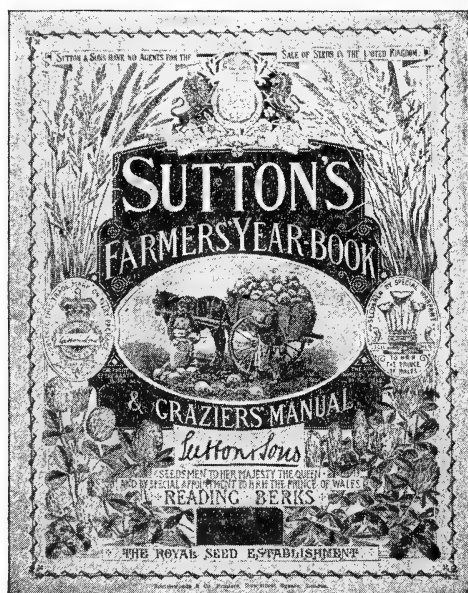
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